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Geography Teaching for the Transition from Junior to Senior High School Based on the Cultivation of Regional Cognitive Literacy

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Abstract: This study designed a geography teaching for the transition from junior high school to senior high school based on regional cognitive literacy, focusing on aspects such as concept construction, regional comparison, and multi-source information integration. Through progressive concept construction, students have significantly improved their understanding of regional element identification and the interrelationships among elements. In the regional comparison exercises, students gradually mastered the unified standards, better analyzed information such as natural conditions and economic structures among different regions, and were able to conduct more logically rigorous, comprehensive comparisons. In the multi-source information integration training, students utilized various types of information such as remote sensing images, topographic maps, and statistical data, enhancing their comprehensive interpretation and analysis capabilities of regional issues. Overall, bridging teaching has effectively enhanced students' abilities in regional cognition, comparative analysis, and information integration, laying a solid foundation for geography learning in high school.

Keywords: Regional cognitive literacy; Teaching for the transition from junior high to senior high school; Multi-source geographic information

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1. Introduction

Regional cognitive literacy is an important core of the geography discipline [1]. It not only relates to the natural environment and the human environment but also carries concepts such as regional integration and human-land survey. In real classrooms, regional teaching in junior high schools mostly focuses on the memory of place names and the description of single elements, while in senior high schools, it emphasizes the integration and comparison of multiple elements [2]. There is a gap between the two. If there is a lack of transition, new freshmen are likely to encounter difficulties in regional concepts, information reading and application, and comprehensive expression. Building a teaching path for the transition from junior high school to senior high school with regional cognitive literacy as the orientation can sort out concepts in a short period of time, unify the comparison scale, and help students form a regional analysis framework through material tasks.

2. The significance of geography bridging teaching from junior high school to senior high school based on the cultivation of regional cognitive literacy

Regional cognitive literacy takes the real geographical space as the carrier, guiding students to understand the intrinsic connections among natural elements, human activities, and comprehensive development within the regional scope. The key lies in helping students shift from the "memory area" to the "understanding area" and the "evaluation area." After entering high school, the curriculum standards put forward higher requirements for regional cognition, emphasizing the use of regional perspectives to explain environmental and development issues. Students are required to possess a comprehensive and effective theoretical framework as well as comparative analysis thinking. If one only stays at the level of memorizing scattered place names and describing single elements during the junior high school stage, it is easy to encounter phenomena such as concept breaks and missing analytical paths at the beginning of the first year of senior high school, which will affect the subsequent regional chapter transition learning and the solution of comprehensive problems. Cultivating regional cognitive literacy around the transition from junior high school to senior high school can reconstruct the regional concept hierarchy on the basis of the original knowledge, make up for the comparison standards and multi-source information reading and application links, enable students to complete the transition from intuitive experience and representational identification to structured and evidence-based regional understanding in a short period of time, and lay a foundation for subsequent core concepts such as the human-land coordination view and the regional sustainable development view. It also helps the discipline of geography form an interdisciplinary learning fulcrum with other disciplines on regional issues.

3. The practical predicaments of regional cognitive competency-oriented junior high school to senior high school transition teaching

3.1. Weak foundation of regional concepts

In the teaching of the transition from junior high school to senior high school oriented by regional cognitive literacy, a weak foundation in regional concepts is a prominent practical predicament. During the junior high school stage, students' regional cognition ability is relatively superficial, and it is difficult for them to truly understand various elements related to regions. Junior high school geography education mainly focuses on basic knowledge education and lacks systematic analysis of regional space. This leads to the fact that when learning senior high school courses, students often find it difficult to handle complex regional concept issues. High school geography requires a relatively high level of understanding of regions. Besides knowing the distribution of geographical elements, it is also necessary to analyze their interactions and influences. Due to an insufficient understanding of the concept of regions during junior high school, many students lack the ability to view regions from an overall perspective. This deficiency in knowledge structure affects their learning outcomes in senior high school.

3.2. Insufficient connection of regional comparative thinking

Regional comparative thinking is an important fulcrum for students to move from static cognition to dynamic interpretation. However, in junior high school, a large number of comparative tasks remain at the level of intuitive perception and scattered feature listing. A common situation in the classroom is that when students are faced with questions like "comparison of river basins," they simply state impressions such as "large water volume," "abundant sediment," and "many cities," lacking a unified evaluation scale and index system. If C_t represents the total number of indicators required to complete a comparison task and C_0 represents the actual number of indicators that students have overlooked or misused, the probability of comparison failure can be expressed as:

$$P_f = \frac{C_0}{C_t}$$

In a diagnostic test for 80 freshmen, researchers set up nine comparative indicators across three dimensions: natural conditions, economic structure, and location connections. The results showed that more than half of the students only touched upon three or fewer items when answering, and some of the answers even completely ignored location and transportation factors, lacking sensitivity to the differences in regional development stages. At this point, the proportion of C_0 is relatively high, and P_f is in a significantly larger state. Further analysis of the classroom questioning records also reveals that many students are accustomed to summarizing their areas with a single strength or label when expressing themselves.

3.3. Difficulty in interpreting multi-source geographic information

The ability to interpret multi-source geographic information directly affects students' level of evidence usage in complex regional contexts. After entering high school, a large number of contour topographic maps, temperature and precipitation line bar composite maps, population density grid maps, and remote sensing images of different resolutions appear in textbooks and examination materials. Freshmen need to complete image reading, numerical judgment, and spatial connection inference in a short period of time. If G represents the ability to read maps and cross-sections, S represents the ability to analyze statistical graphs and data tables, and R represents the ability to interpret remote sensing and comprehensive images, a multi-source information reading index can be constructed:

$$M = \alpha G + \beta S + \gamma R$$

Among them, α, β, and γ represent the weights of the three types of information in regional learning. The results of a pre-test conducted on 120 students from three classes of Grade 10 in a certain school show that among the three sets of materials with themes of urban heat islands, plain agricultural areas, and soil erosion prevention, most students can complete the simple readings of a single graph. However, when it comes to the combination of superimposed charts and textual explanations, they are obviously hesitant and often only adopt one type of evidence. Statistics show that over 70% of students do not quote remote sensing information in comprehensive questions, and nearly 60% of students are reluctant to use specific data to support their viewpoints when explaining regional development issues. The reasons for this are, on the one hand, related to the low frequency of using multi-source materials during junior high school, and on the other hand, it also reflects that students lack cross-media integration paths and operational experience. If the R dimension remains at a low level for a long time, the M index will be difficult to meet the standards required for comprehensive learning in high school regions. Multi-source information can only serve as a foreground decoration in the classroom and is hard to truly play the role of evidence-based driving.

4. Teaching design strategies for the transition from junior high school to senior high school in geography oriented by regional cognitive literacy

4.1. Progressive concept construction mainly based on the core area concept

The progressive concept construction strategy, mainly based on the core area concept, is specifically designed for the teaching transition of geography from junior high school to senior high school, aiming to help students transition from the most basic regional definition to the comprehensive regional analysis ability in the senior high school stage [3]. Students learn the basic concepts of regions, such as "natural environment" and "humanistic environment," through specific cases, and further understand the basic characteristics and interrelationships of regions. By analyzing the natural resources, climate characteristics, and other contents of a specific area, it helps students form a preliminary regional cognition. As learning progresses, the teaching content focuses on the analysis of differences among various regions, encouraging students to gradually establish their perception and understanding of regional differences by observing the variations in climate, economic structure, and other aspects among different regions. Through this process, students can not only understand the uniqueness of different regions but also comprehend their interconnections and influences. In addition, the importance of practical participation is emphasized in the teaching process. Teachers can use methods such as regional field investigations, data analysis, and chart presentations to enable students to deepen their understanding and application of regional concepts in practice.

A certain school selected 45 students from each of two parallel classes to conduct a comparative assessment before and after the concept construction. The results are exemplified in **Table 1** below.

Table 1. Comparison of the achievement rates of students' concept construction before and after

Evaluation dimension	The compliance rate before connection (%)	The compliance rate after connection (%)
Be able to list the main regional elements	62.2	88.9
Be able to describe the interaction among elements	47.6	80.0
Be capable of drawing regional structure concept maps	33.3	73.3

As can be seen from **Table 1**, the compliance rates of the three evaluation dimensions have all increased significantly after the connection teaching. Among them, the rate of "being able to list the main regional elements" has risen from 62.2% to 88.9%, indicating that students' basic memory and perception of the regional constituent elements have become more complete, providing a fundamental support for the subsequent deepening of concepts. The proportion of "being able to describe the interaction between elements" has increased from 47.6% to 80.0%, reflecting that progressive concept construction and classroom discussion activities have a significant promoting effect on students' understanding of the internal relationships within the region. Students are gradually beginning to shift from "seeing elements" to "understanding connections." The proportion of "being able to draw regional structure concept maps" rose from 33.3% to 73.3%, with an equally significant increase. However, the overall level is still relatively low compared to the previous two, indicating that there are still certain difficulties in converting elements and relationships into a visual structural framework.

4.2. Hierarchical regional comparison training under a unified comparison standard

In regional comparative teaching, introducing a unified comparative standard and implementing stratified training can help students form a transferable comparative thinking mode [4]. During the transitional stage, an indicator system can be established by utilizing four aspects: natural foundation, economic structure, population and town, and location connection. Then, a task sequence from simple to complex can be designed based on the students' cognitive starting point. The early tasks focus on the natural basis, requiring students to make a rough comparison of typical areas according to the combination of landform types, heat, and moisture. The mid-term tasks incorporate industrial and transportation factors to guide students to think about "how such an industrial pattern was formed." The later tasks will attempt to present the comprehensive comparison results of multiple regions on a unified table or coordinate axis.

Taking 80 students from two parallel classes of a certain grade as the subjects, the pre- and post-assessment scores of the regional comparison assignment were conducted, and the results are shown in **Figure 1**.

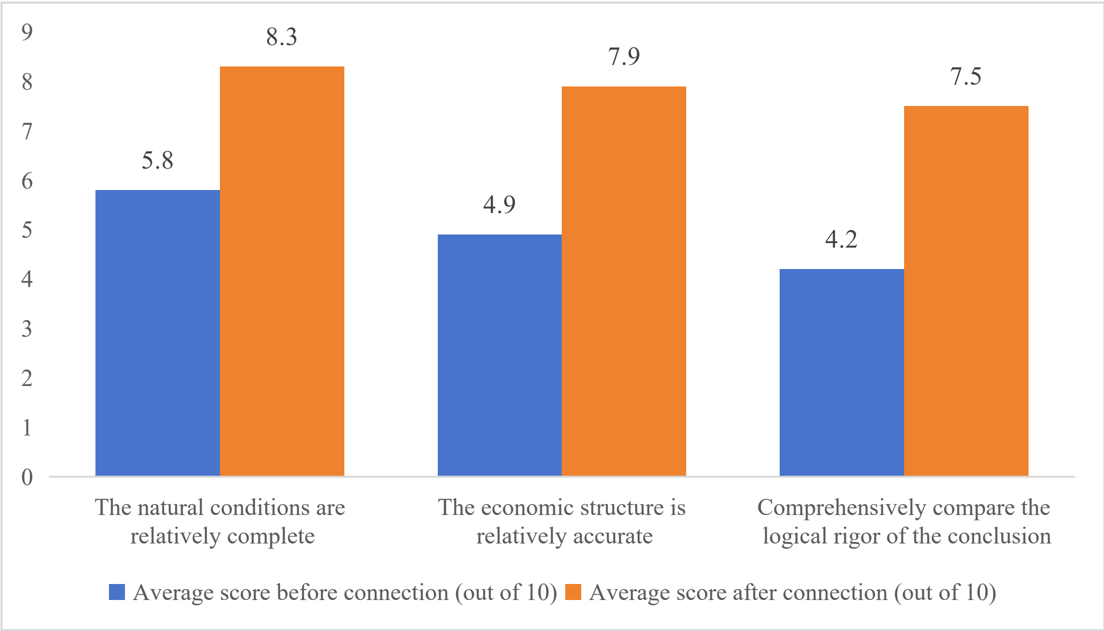

Figure 1. The assessment scores of students before and after their homework in different areas

From the data in the figure, it can be seen that bridging teaching has significantly enhanced students' ability in three core dimensions of regional comparison. In terms of "relatively complete natural conditions," the average score rose from 5.8 to 8.3, indicating that students can conduct more comprehensive comparisons of basic indicators such as terrain and climate under a unified comparison standard. The "comparative accuracy of economic structure" has risen from 4.9 to 7.9, indicating that students have begun to understand the relationships among regional economic factors and have broken through their reliance on natural geography. The logical rigor of the comprehensive comparison conclusion has risen from 4.2 to 7.5, indicating that students have made progress in using evidence and argumentative expression, and are capable of conducting more logical, comprehensive analysis by combining data and diagrams. This indicates that bridging teaching effectively promotes students' progression from basic observation to comprehensive analysis.

4.3. Integrated reading and application teaching for multi-source geographic information

The integrated reading and application teaching strategy for multi-source geographic information aims to help students comprehensively enhance their regional analysis capabilities by integrating various types of geographic information, such as maps, remote sensing images, and statistical data [5]. Under this strategy, students not only learn how to interpret and analyze a single information source, but also can conduct comprehensive interpretation and analysis by combining multiple geographic data in actual cases. By guiding students to apply multi-source geographic information to solve regional problems, they can enhance their spatial thinking and data integration capabilities, thereby better understanding the connections and differences among regions. During the transition from junior high school to senior high school, students gradually master complex regional analysis skills, can effectively process various data and information, and gradually enhance their comprehensive analysis ability of regional issues in practice. In addition, students will learn to evaluate and compare the advantages and disadvantages of different data sources, understand the complementary roles of various geographic data in regional analysis, and enhance their ability to judge and make decisions based on data.

A certain school conducted a multi-source task pre- and post-test among 48 students in two classes of Grade 10, quantitatively evaluating the students' performance in different dimensions. The result examples are shown in **Figure 2** below.

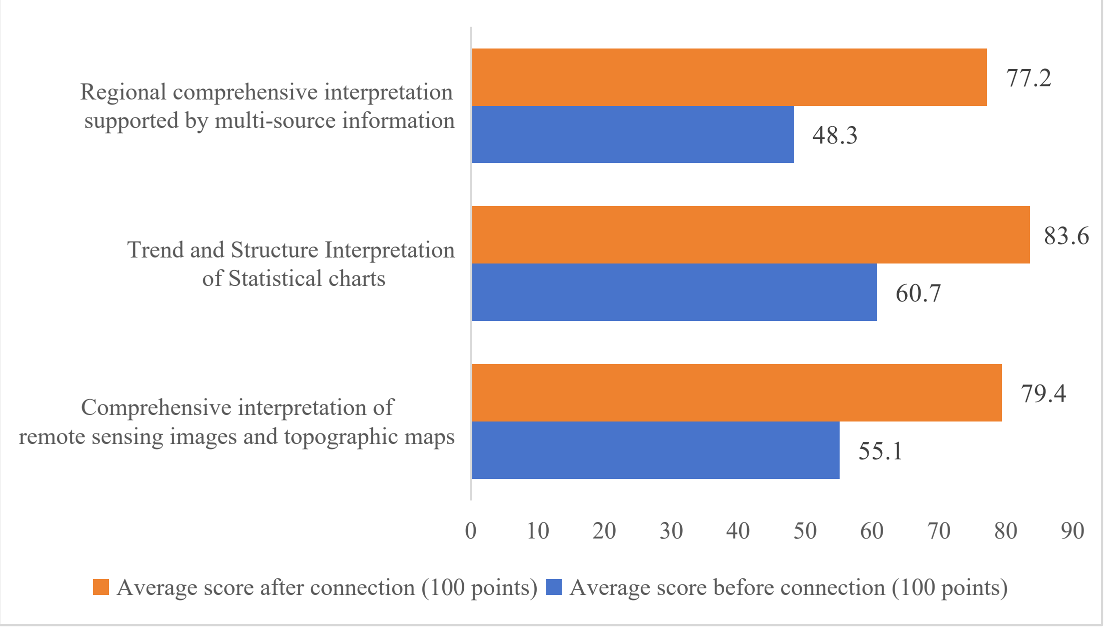

Figure 2. The performance scores of students in different dimensions

It can be seen from the figure that the integrated teaching of multi-source geographic information reading and application has brought about significant improvements in all three dimensions. The score of "Comprehensive Interpretation of Remote Sensing Images and Topographic Maps" has risen from 55.1 to 79.4, indicating that students are more sensitive in identifying terrain undulations, urban boundaries, river flows, etc., and can also establish corresponding relationships between images and contour lines. The score for "Trend and Structure Interpretation of Statistical Charts" has risen from 60.7 to 83.6, with an equally significant increase. This reflects that when students understand line charts, bar charts, and composite charts, they are no longer limited to simple readings but are gradually developing the awareness of trend judgment and structure comparison. The score for "Comprehensive Regional Interpretation Supported by Multi-source Information" has risen from 48.3 to 77.2, representing the largest increase. This change indicates that students are beginning to attempt to simultaneously invoke image information, statistical data, and textual materials in their responses to construct a relatively complete, comprehensive analysis framework.

5. Conclusion

This study, through the teaching of the transition from junior high school to senior high school oriented by regional cognitive literacy, has enhanced students' abilities in regional concepts, regional comparisons, and the reading and application of multi-source information. In terms of concept construction, the achievement rate of students in "being able to list the main regional elements" and "being able to describe the interaction between elements" has significantly improved. It indicates that students have a deeper understanding of regional composition and internal connections. In terms of regional comparison, by unifying the comparison standards, students' scores in dimensions such as "comparative integrity of natural conditions" and "comparative accuracy of economic structures" have significantly improved, demonstrating a strong ability to analyze regional differences. In terms of multi-source information integration, students' capabilities in interpreting remote sensing images, statistical charts, and text information have also significantly enhanced. In conclusion, the teaching approach oriented towards regional cognitive literacy effectively promotes the transition of students from basic cognition to advanced analytical abilities, laying a foundation for subsequent regional comprehensive learning and the cultivation of the concept of human-environment coordination.

Disclosure statement

The author declares no conflict of interest.

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