Article

Practical Exploration of Interdisciplinary Integration Teaching in High School History and Geography under the Digitalization Context

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Abstract: Interdisciplinary integration teaching is an important direction of the new curriculum reform. The isomorphic nature of history and geography subjects in terms of time and space dimensions provides a foundation for their integration. However, in actual teaching, factors such as difficulty in obtaining resources and the fragmentation of disciplinary logic have long hindered the implementation of interdisciplinary integration teaching. Based on the background of educational digitalization and in accordance with the relevant requirements of the "General High School History Curriculum Standards (2017 Edition 2020 Revised)" and the "General High School Geography Curriculum Standards (2017 Edition 2020 Revised)", this paper builds a learning framework through theme integration, empowers teaching implementation through digital technology, and establishes educational orientation through the development of qualities. It analyzes the internal mechanism of digital resources supporting the integration teaching of history and geography; and summarizes four practical paths that are operable: theme extraction, resource reorganization, task chain design, and evaluation follow-up. Combined with the case study "The Opening of Global Routes", it demonstrates that digital resources such as GIS and ArcGIS transform the originally abstract time and space relationships into observable and comparable evidence, thereby reducing the difficulty of students' time and space cognition and supporting the implementation of the core competencies of "time-space concept" in history and "comprehensive thinking" in geography. At the same time, the article also explores practical problems such as superficial application of technology, high cost of teacher collaboration, and lagging teaching evaluation, and proposes improvement directions for the construction of school-based resource libraries and collaborative teaching in history and geography.

Keywords: Digitalization; High School History; High School Geography; Interdisciplinary Integration

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1. Introduction

Subject integration teaching is an important direction of the recent curriculum reform in ordinary high schools. The "History Curriculum Standards (2017 Edition 2020 Revised)" of ordinary high schools lists "spatial-temporal concepts" as one of the five core competencies, and clearly requires that the history curriculum should not only pay attention to the connection with other subjects such as politics, language, art, geography, and information, but also help students learn other subjects, aiming to enable related subjects to play an overall role [1]; The "Geography Curriculum Standards (2017 Edition 2020 Revised)" requires students to have the ability to recognize regions using a multi-disciplinary perspective [2]. This provides a theoretical basis for the integration of history and geography teaching.

History is the real events that occurred in the past, and human activities are inseparable from specific natural geographical environments. Therefore, the two subjects can be integrated in terms of "time and space". However, in teaching, the intrinsic

connection between the history and geography subjects is often severed. In the history class, when teaching "The Opening of Global Routes", the focus is on the motivations and conditions for the opening of new routes. Although students have mastered the motivations and conditions, they ignore that Dias, da Gama, Columbus, and Magellan opened routes from this place to that place, thereby affecting their understanding of the impact of the opening of new routes; In the geography class, when teaching "The Location Factors of Agriculture", the focus is on the static analysis of climate, terrain, and water sources. Students can master these factors, but they do not understand "how these factors functioned in history". In summary, the two classes have respectively completed the knowledge explanations that are in line with their own course objectives, but due to the lack of subject integration, it is difficult for students to form a three-dimensional framework of "human - time - space".

The application of generative artificial intelligence and history interdisciplinary teaching activities have inherent consistency in the three dimensions of value goals, thinking logic, and practical orientation [3]. The intervention of digital technology has made it possible to construct the three-dimensional framework of "human - time - space". The history subject has long been constrained by the "unrepeatability of the scene" dilemma, while the geography subject is constrained by the "difficulty in presenting dynamic processes" dilemma. With the development of technology, digital maps, geographic information systems (GIS), GeaCron, etc., can convert static text and images into dynamic spaces that can be overlaid, compared, and interacted with, promoting the integration teaching of history and geography. It should be noted that due to the limited popularization of technology and the digital literacy level of teachers, many current "digital integration" teaching still remains at the level of playing videos and showing maps, and technology has not played a role in promoting subject integration, and students' cognitive methods have not undergone substantive changes. Based on this situation, this paper attempts to answer three questions: First, where is the integration point between history and geography; second, what functions should digital tools undertake in the integration teaching; third, taking "The Opening of Global Routes" as an example, design a practical path for the integration teaching of history and geography that can be implemented regularly.

2. The Intrinsic Logic of Interdisciplinary Integration in Historical Geography

2.1. "spatio-Temporal Isomorphism" Is the Foundation of Integration

The interdisciplinary thematic teaching takes historical themes as the main content line, connecting the knowledge points of different lessons and different disciplines [4]. All historical events occurred in specific regions, and all regions have traces of human activities. Therefore, the intersection point of history and geography integration is "time-space". Teachers cannot simply think that using a map when teaching history or telling a historical story when teaching regional geography is integration of disciplines. The integration of history and geography should be carried out around a core issue that can simultaneously bear the development of time and the changes of space. For example, "Why did the economic center of ancient China shift from the Yellow River Basin to the Yangtze River Basin?" This question is not only a political and economic pattern change problem in history, but also a regional condition comparison problem in geography. Therefore, achieving "spatio-temporal isomorphism" from a dual-discipline perspective and finding the essence of historical events is the true sense of history-geography integration teaching.

2.2. Digital Resources Are the Scaffolding for Integration

Traditional classrooms are constrained by the problem of insufficient resources, so when integrating history and geography, they often face obstacles. The first is the visualization problem. Static pictures such as textbooks and atlas cannot directly present the process of spatial change. Therefore, when encountering historical events such as the expansion of human civilization or the stages of wars, teachers can only describe them

with language. However, with digital resources such as QGIS, ArcGIS, and atlas books, the time dimension can be visualized, and multiple static pictures can be combined through layer overlay to form a dynamic evolution, allowing students to visually see the differences of the same region at different times. The second is the comparability problem. Static pictures in textbooks can only complete "change" through imagination, but with digital resources, the process of "change" can be presented through interactive methods such as controlling layers and controlling time sliders. Students can observe phenomena such as the change of rivers and the displacement of settlements by clicking on layers or dragging the timeline. Through observation and experimentation, they can gain cognition. Integrating digital means with interdisciplinary teaching in high school history can not only make up for the inherent shortcomings of traditional classrooms, such as insufficient materials, time-space limitations, and single evaluation, but also inject new vitality into the dull history classroom [5].

2.3. Three Principles of Interdisciplinary Integration

Based on the above analysis, this study established three principles. First, build a learning framework by integrating themes. The core themes of interdisciplinary integration must have both historical and geographical analytical value. Second, empower teaching implementation with digital technology. Digital technology serves cognitive difficulties and avoids the phenomenon of "digitization for the sake of digitization". Third, establish an educational orientation by developing qualities. The focus of interdisciplinary integration is to enable students to break through disciplinary barriers, enhance their cognition, rather than simply adding the knowledge of two disciplines.

3. Practical Approaches to Digital Integrated Teaching

3.1. Building a Learning Framework through Theme Integration

Operation Path for Theme Extraction: First, select issues related to time and space from the history textbooks, and then select key concepts with temporal attributes from the geography textbooks. The intersection of these two is the high-quality integrated theme.

3.2. Enabling Teaching Implementation through Digital Technology

The key to resource construction is not "collecting more materials", but classifying and configuring the materials according to cognitive functions. The classification basis is not the form of the resource's carrier, but its role in the task chain. In practice, resources can be divided into four categories (Table 1).

Table 1. Forms and Teaching Functions of Digital Resources

Resource Type	Typical Form	Teaching Function
Spatial Type	Maps, GIS layers, dynamic maps	Establishing references for positions and processes
Historical Materials	Historical documents, official papers, archives	Provide evidence and conduct historical research based on factual evidence
Data category	Population, trade, climate	Make comparisons and draw inferences
Situation-based	Three-dimensional restoration, virtual scenes, generative tools	Activating imagination, formulating hypotheses

3.3. Four-Level Task Chain Design in a Stepped Progression

The task design in the integrated classroom follows a stepped progression, forming a four-level task chain. The first level: Positioning. Through historical material descriptions, students are required to mark the corresponding geographical features on a digital map, solving the problem of "where". The second level: Comparison. By superimposing the layers of two periods, students are asked to describe the changes in spatial form, solving the problem of "what changes". The third level: Attribution. By

invoking data such as climate, hydrology, and population, students are required to explain the possible reasons for the changes, solving the problem of "why did it change". The fourth level: Argumentation. Based on an evidence chain formed around a controversial issue, students are required to solve the problem of "how to prove". The four levels of tasks correspond to the cognitive laws from lower to higher levels. Teachers can make choices based on the learning situation, but it is not advisable to remain at the first and second levels for a long time.

3.4. Implementing Process Evaluation through Digital Portfolios and Performance Scales

The evaluation in integrated teaching should simultaneously focus on the performance of the two subjects' competencies. It should adopt a combination of digital portfolios and performance scales. The portfolio collects students' practical operation records, while the scale points to observable behavioral performances.

4. Lesson Practice: "The Opening of Global Trade Routes"

4.1. Design Concept

This lesson is designed for the first-year high school students. The core question is: the reasons, process and impact of the opening of new trade routes. The teaching objectives include three points: first, being able to depict the traditional trade routes before the opening of new trade routes on the map; second, understanding the reasons for the opening of new trade routes by combining the development of Western European society; third, being able to extract the impact of the opening of new trade routes by combining the trade routes and historical materials after the opening.

4.2. Implementation Process

Section 1: Context Introduction (about 5 minutes). Time and space are the common keys for history and geography. Geography tells us that in the vast ocean, there are fixed patterns of wind direction and ocean currents. History tells us that people in different eras have completely different understandings of the ocean space. Before the opening of new trade routes, people believed that the Atlantic Ocean was the end of the world, but by the end of the 15th century, Europeans began to try to re-recognize this ocean. Their voyages were not only an exploration activity, but also a breakthrough in human self-understanding. Their voyages broke the isolated state of continents and human beings began the history of globalization.

Section 2: Layer Exploration (about 10 minutes). Students open the continental distribution layer, ocean layer, Silk Road route layer and new trade route layer on the digital map platform one by one. They observe the spatial relationship among the four layers. Students can discover from the dynamic layers that after the opening of new trade routes, Western European countries adjacent to the Atlantic Ocean became the center of world trade, and Asia, Africa, America and Europe established direct connections. The world began to become a whole. From a geographical perspective, the routes to the east are all sailing along the coastlines, while the route to America towards the west needs to cross the Atlantic Ocean, which is riskier.

Section 3: Data Argumentation (about 15 minutes). The teacher provides students with materials such as Ptolemy's world map, navigator's route map, world continent outline map, GIS dynamic time series map, etc. Let students discuss in groups "Why were Western European countries the ones who opened new trade routes" and "The influence of monsoons and ocean currents on long-distance voyages" and form conclusions. When different viewpoints arise in the class, the teacher does not rush to judge right or wrong, but does a good job in guiding and returning to the evidence.

Section 4: Transfer and Creation (about 10 minutes). Students work in groups to create a "different route to Asia" on the platform and explain the advantages and difficulties of opening this route based on historical and geographical knowledge. Present the works in class and have the teacher and students conduct process evaluation based on the scale.

4.3. Implementation Effect and Reflection

From classroom observation, students' performance has three changes. First, the questions they ask are deep and have content, shifting from "Which routes were opened" to "Why go to these places", indicating an improvement in students' deep thinking ability. Second, students' evidence-based argumentation awareness has significantly increased. When students answer the questions, some students do not rely on the teacher's authoritative judgment but will actively ask "Is this conclusion supported by evidence?" Third, students have learned to organize language and answer questions using different disciplinary terms.

However, some problems also emerged in the class, such as the need for dual-teacher collaborative lesson planning for the integration of history and geography, and the time required for lesson planning and other aspects is much longer than single-teacher teaching; the layer operation of the digital platform occupied a certain amount of class time, and some students were attracted by the tool itself, easily showing the phenomenon of "playing the map" rather than "reading the map". These problems indicate that sufficient time must be reserved for technical operation in interdisciplinary teaching, and the tasks and questions of integration must be clear.

5. Outcomes, Issues and Improvements

5.1. Main Achievements

At the student level, students' ability to verify historical facts through materials has improved. At the teacher level, the history and geography teaching group has established a regular mechanism for joint lesson planning, and both parties have significantly enhanced their familiarity with each other's teaching materials and deepened the integration in the classroom. At the resource level, a batch of reusable digital resource packages and task sheets have been accumulated around the integration theme, and a school-based curriculum has been developed.

5.2. Existing Issues

First, there are differences in teachers' digital literacy. Some teachers are not proficient in operating platforms such as GIS, and when technical failures occur in the classroom, they lack contingency plans, easily retreating to the old way of teaching mainly through lecturing. Second, the reform of evaluation lags behind teaching. Traditional paper-and-pencil tests are difficult to fully evaluate the argumentation skills that students have developed in the integration classroom, which will affect students' enthusiasm and initiative in participation. Third, the application of technology is superficial. Most classrooms remain at the first two functions of visualization and comparability, and there are relatively few cases where students model, draw, and argue.

5.3. Improvement Directions

The above issues can be improved in the following aspects. First, promote the digital transformation of teacher professional development to enhance teachers' digital innovation and application capabilities; second, restructure the evaluation system to increase the weight of process evaluation to stimulate students' enthusiasm and initiative; third, complete a complete task of "modeling - mapping - argumentation" at least once every semester, and push the use of technology to the third function.

6. Conclusion

The integration of history and geography is not simply adding the two subjects together. It is based on the isomorphism of time and space, integrates themes to build a learning framework, uses digital resources as a support, empowers teaching implementation with digital technology, promotes the development of students' empirical literacy through a step-by-step task chain, and finally confirms the improvement of students' abilities through process evaluation. This path does not rely on high-end

equipment and does not require teachers to become technical experts. The integration effect depends on the accuracy of theme selection and the focus of task design.

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