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Research on the Design of Interdisciplinary Theme-Based Learning in High School Geography Based on Authentic Contexts

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Abstract

This paper focuses on the design of interdisciplinary theme-based learning in high school geography based on authentic contexts, aiming to provide practical teaching solutions that better align with students' cognitive development and literacy cultivation. It first elaborates on the necessity of interdisciplinary theme-based learning in geography grounded in real-world situations, then analyzes the design logic of such learning approaches. Subsequently, leveraging the comprehensive nature of geography, it explores specific design methods for theme identification, goal setting, activity planning, and evaluation systems. The study aims to offer teachers actionable teaching strategies and help students enhance their geographical understanding and interdisciplinary application skills.

Keywords

high school geography; authentic contexts; interdisciplinary theme-based learning

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1. Introduction

The "Compulsory Education Geography Curriculum Standards (2022 Edition)" explicitly incorporates interdisciplinary thematic learning as a core component of junior high school geography education[1]. It defines this approach as: "An integrated learning method that builds upon students' foundational knowledge, experiences, and interests, centers around specific research themes, utilizes geographical curriculum content as the framework, and applies cross-disciplinary knowledge and methodologies." Conducting research on designing real-world scenario-based interdisciplinary thematic learning for high school geography enables teachers to break down disciplinary barriers, deeply integrate geographical knowledge with practical contexts and other subjects[2]. This approach transforms students from passive memorization of theories to active problem-solving that enhances comprehensive skills. Furthermore, it provides valuable references for optimizing interdisciplinary teaching in high school geography education, ultimately helping students better adapt to competency-oriented learning requirements[3].

2. The Necessity of Focusing on Real-World Contexts in Interdisciplinary Geography Learning

2.1. Comply with the trend of educational reform and development

The ongoing educational reform is advancing interdisciplinary integration and contextualized teaching methods, moving beyond traditional single-subject knowledge delivery to emphasize cultivating students 'ability to apply multidisciplinary knowledge in solving real-world problems. By focusing on authentic geographical cross-disciplinary thematic learning, we can break down barriers between geography and other subjects. Through designing learning themes that mirror real-life scenarios, students integrate knowledge and develop practical skills while tackling real-world challenges[4]. This approach not only aligns with the educational reform's emphasis on holistic competency development but also transforms geography education from passive reception to active exploration, reflecting the prevailing trend in modern pedagogical development.

2.2. The need to improve students' comprehensive quality

Geography is inherently interdisciplinary, encompassing natural environments, human societies, and economic development. The learning process often requires integrating knowledge from physics, biology, history, and political science. Cross-disciplinary thematic learning designs real-world scenarios to help students synthesize multidisciplinary insights for solving geographical challenges. For example, when analyzing regional water resource issues, students must combine climate patterns with ecological conservation principles and chemical testing techniques[5]. This integrated approach not only deepens geographical understanding but also cultivates essential competencies like comprehensive thinking and practical application, ultimately fulfilling the holistic development needs of students.

2.3. Enhance the practical significance of geography teaching

Geography is deeply intertwined with real-world life. From regional climate changes and urban planning to daily travel route choices and crop cultivation distribution, geographical knowledge finds its practical applications everywhere. By focusing on interdisciplinary geographical themes rooted in real-life scenarios, we can effectively bridge textbook knowledge with real-life contexts. For instance, designing learning themes around "community waste sorting and urban environmental governance" allows students to apply regional environmental analysis skills while connecting with environmental protection and economic domains. This approach enables learners to tangibly experience how geographical knowledge addresses practical issues, making geography education more relevant and impactful in modern society[6].

3. Design Logic of Interdisciplinary Thematic Learning in Geography Based on Real-World Contexts

3.1. Selection based on real situation materials

Interdisciplinary thematic learning demands strong inquiry skills from students. By focusing on specific research topics, learners establish core content frameworks for geography studies, enhancing their mastery and flexible application of geographical knowledge – a crucial foundation for developing cross-disciplinary competencies[7]. When selecting authentic contextual materials, educators should explore three primary dimensions: daily life, social issues, and natural phenomena, while ensuring materials maintain strong connections with core geographical concepts and provide intellectual stimulation. For instance, the daily life dimension could examine local river pollution patterns; social dimensions might address urban metro planning hotspots; natural dimensions could utilize geographical features like topography and geomorphology. Priority should be given to materials directly supporting core geographical knowledge. Urban metro planning relates to urban spatial structure concepts, while river pollution connects with water cycle management and pollution control. Materials must stimulate critical thinking, ensuring they are both relatable and provide solid foundations for interdisciplinary learning.

3.2. Integration of multidisciplinary knowledge

Geography is closely linked with multiple disciplines, including history, biology, physics, chemistry, politics, and mathematics. When designing thematic learning programs, educators should focus on core geographical

issues while integrating interdisciplinary knowledge to create interconnected knowledge networks[8]. For example, when exploring the theme "Ecological Conservation and High-Quality Development of the Yellow River Basin," geography examines how terrain, topography, and hydrological features impact ecosystems. History supplements this with insights into ancient civilization development and ecological transformations in the region. Biology analyzes biodiversity conservation strategies within the basin, while chemistry investigates water pollution detection and treatment technologies. This integrated approach allows different disciplines to complement each other around the central theme, addressing geographical challenges while fostering comprehensive understanding and building a cohesive knowledge framework.

3.3. Setting up activities around problem solving

When designing problem-solving activities, educators should use authentic contexts and interdisciplinary knowledge as foundations. The process begins with constructing a well-structured problem framework that guides students through knowledge integration and application[9]. Questions should follow a progressive logic: Start with foundational cognitive questions to reinforce core geographical concepts, then introduce interdisciplinary inquiry questions that connect different subjects. Finally, present comprehensive application challenges requiring students to analyze and solve real-world problems using multidisciplinary knowledge. This layered approach creates a learning progression through exploratory questions that stimulate critical thinking. As students progressively overcome these challenges, they actively integrate geographical insights with cross-disciplinary knowledge, achieving simultaneous enhancement of both practical application and analytical skills.

4. Design of interdisciplinary thematic learning in high school geography based on real situation

4.1. Focus on realistic issues and determine teaching themes

In designing interdisciplinary thematic learning for high school geography education grounded in real-world contexts, establishing appropriate themes and scenarios constitutes the foundational step. This process requires close alignment with core geographical curriculum objectives while carefully considering students' cognitive levels, life experiences, and interests. Educators should curate topics that meet pedagogical needs through practical real-life examples. By transforming these topics into vivid, concrete, and engaging authentic scenarios, we create a solid foundation for subsequent interdisciplinary knowledge integration and inquiry activities. This approach enables students to quickly immerse themselves in learning environments and actively participate in exploring and applying geographical concepts[10].

Taking the "vegetation" teaching in high school Geography Compulsory Course 1 as an example, this lesson focuses on guiding students to identify morphological characteristics and distribution patterns of different vegetation types, while understanding their interactions with natural environmental elements such as climate, terrain, and soil. Knowledge points in biology like "plant environmental adaptability" and "community structure and succession" align closely with geographical vegetation content. The lesson theme can be introduced through familiar scenarios, combining real-world issues like "urban green space ecological restoration" into "Exploring the 'Form' and 'Context' of Urban Green Vegetation—— Investigating vegetation features, environmental relationships, and ecological value." To make the scenario more tangible, teachers prepared authentic materials: pre-recorded videos of local urban forest parks vividly showcasing vegetation landscapes in lakeside areas, slopes, dense forests, and open lawns; and "Green Space Vegetation Growth Monitoring Tables" provided by park management offices containing actual data on plant species, growth rates, and pest conditions[11]. After presenting the videos and tables, teachers posed guiding questions: "Why do the vegetation forms differ between lakeside and slope areas in the video? Could slower growth of some trees in the monitoring table be related to surrounding light conditions or soil? What benefits can these urban green spaces bring to our living environment?" Through familiar scenarios, real data, and tiered questions, students are quickly immersed in the context, laying a foundation for subsequent learning

activities that integrate geographical and biological knowledge.

4.2. Set teaching objectives according to the characteristics of the subject

In interdisciplinary thematic learning of high school geography grounded in real-world contexts, the core lies in establishing objectives and connections that align with disciplinary characteristics. By focusing on selected themes, educators should clearly define geographical knowledge, interdisciplinary competencies, and emotional goals[12]. These objectives should form a cohesive framework where each discipline's goals mutually reinforce and synergize, ensuring the cultivation of core geographical literacy while expanding learning dimensions through cross-disciplinary connections. This approach helps students comprehensively grasp knowledge and enhance their integrated capabilities.

Taking the "Meteorological and Hydrological Disasters" lesson in High School Geography Compulsory Course 1 as an example, this class primarily explains the types and causes of meteorological disasters such as heavy rainstorms and typhoons, as well as hydrological disasters like floods[13]. It analyzes their spatiotemporal distribution characteristics and impacts on human production and daily life, while introducing basic disaster prevention and mitigation measures. This lesson can be deeply integrated with physics knowledge, as concepts like "atmospheric thermal circulation," "fluid motion," and "pressure" in physics provide theoretical support for analyzing disaster causes and response strategies. Centered on the theme of "Exploring the Causes and Scientific Responses to Local Summer Heavy Rainfall Floods," the course establishes interdisciplinary objectives by combining geography and physics. At the knowledge level, students need to master geographical conditions affecting rainstorm floods and their impacts on production and daily life, while understanding physical processes like atmospheric water vapor condensation, precipitation formation, flood runoff dynamics, and liquid pressure principles from physics. They should be able to explain the complete logical chain from precipitation formation to disaster occurrence using combined disciplinary knowledge. At the competency level, students can apply geographical skills like map analysis and data interpretation to identify high-risk flood zones using local topographic maps and rainfall statistics. Additionally, they can use physics principles to analyze the physical causes of intense rainfall and the relationship between flood impact force and terrain slope, ultimately proposing scientific disaster prevention recommendations through interdisciplinary integration. Emotionally, the awareness of disaster prevention and reduction should be enhanced in the process of exploration, the scientific concept of "understanding nature and coping with disasters with interdisciplinary knowledge" should be established, the sense of responsibility of respecting natural laws and actively protecting life and property safety should be cultivated, and the coordinated cultivation of geographical man-earth coordination view and physical science application view should be realized.

4.3. Plan learning activities according to learning needs

When designing learning activities based on educational needs, educators should integrate core thematic elements with students' cognitive characteristics to create diverse and tiered inquiry tasks. These tasks must address various learning objectives including knowledge comprehension and skill application, while stimulating student engagement through interactive and practical activities. By fostering both independent exploration and collaborative inquiry, students can deepen their understanding of the subject matter, achieving knowledge internalization and comprehensive skill development.

Taking the "Major Environmental Issues Facing Humanity" section from the High School Geography Compulsory Course 2 as an example, this lesson focuses on three major categories of environmental issues. It analyzes both natural and human-induced causes, discusses the hazards these issues pose to human survival and development, and examines their regional and global connections. This lesson can be integrated with Moral Education and Rule of Law content such as "Ecological Civilization Construction" and "Citizens 'Environmental Responsibilities," featuring various learning activities[14]. For instance, organizing a "Local Environmental Survey" practical activity where students work in 5-6 person groups to select one research site near their school (e.g., community waste sorting stations, nearby rivers, or factories), design survey forms, and spend one week

after class conducting research. They document data, take photos, conduct interviews, and compile findings into research reports. In class, each group presents for 5 minutes: first identifying environmental issues discovered through surveys, then analyzing their impacts from a geographical perspective, and finally proposing three specific improvement suggestions based on Moral Education's "Citizens 'Environmental Obligations." Another activity could be a debate titled "Which is More Important: National Responsibility or Individual Responsibility in Global Environmental Governance?" Students are divided into pro and con teams. The pro team argues for national policy-making and international cooperation from geographical perspectives of "global environmental issues" and moral considerations of "national sovereignty and international obligations." The con team counters with personal examples like low-carbon commuting and energy conservation to demonstrate how individual actions contribute to environmental solutions from the perspective of "local environmental issues" and citizens' daily responsibilities. After the debate, teachers summarize the concept of "mutual reinforcement between national leadership and individual participation," reinforcing dual awareness of human-environment coordination and legal responsibilities.

4.4. Carry out scientific evaluation by using diversified methods

To implement scientific evaluation through diversified approaches, we must transcend the limitations of traditional paper-and-pencil tests[15]. By aligning with thematic objectives and learning activity characteristics, we should design assessment content and methods from multiple dimensions including knowledge mastery, skill enhancement, and quality development. Through the integration of formative and summative evaluations, as well as the complementarity between teacher assessments and peer reviews, we can comprehensively reflect students' learning outcomes. This approach not only leverages the feedback and guidance functions of evaluation but also facilitates subsequent teaching optimization.

Taking the "Service Functions of Natural Environment" in the High School Geography Compulsory Course 3 as an example, this lesson focuses on understanding four major types of natural environment services: provisioning services, regulating services, cultural services, and supporting services, along with their connotations. The lesson can be integrated with biology by leveraging the "Ecosystem Structure and Function" knowledge to deepen students 'understanding of natural environment provisioning services. To achieve interdisciplinary learning objectives, a diversified evaluation system is established: First, formative assessment is conducted through "group inquiry records" and "class presentation scoring sheets," evaluating students' performance in the "Local Wetland Park Service Function Research" activity—— such as identifying regulatory services (water purification) and cultural services (leisure tourism) using geographical knowledge, and explaining supporting services (soil stabilization through plant root systems) with biological insights. Teacher-student peer evaluations account for 40% of the score. Second, summative assessment adopts an "interdisciplinary task sheet" format, requiring students to create a "Four Major Service Functions of Forest Ecosystems" diagram while annotating how biological principles like "food chains" and "material cycles" support these functions. Teachers evaluate from three aspects: "knowledge accuracy," "logical coherence," and "interdisciplinary integration," accounting for 50% of the score. Third, reflective evaluation is added where students write learning reflections to articulate their evolving understanding of "the relationship between natural environmental service functions and human activities," assessing the development of critical thinking skills, which accounts for 10% of the score. Through this multi-dimensional evaluation system, we comprehensively assess students' knowledge mastery, practical abilities, and conceptual formation, providing precise feedback on learning outcomes.

In conclusion, through real-world interdisciplinary thematic learning, students develop scientific methodologies to identify challenges, progressively enhancing their problem-solving skills and adaptability. This approach cultivates the ability to apply cross-disciplinary thinking in addressing complex real-world issues. Moving forward, we should explore more localized contexts—such as designing educational themes around ecological conservation or urban planning

in students' hometowns—while strengthening school-community partnerships. By engaging students in community and corporate practices, we can transform theoretical knowledge into practical problem-solving capabilities, ultimately making geography education more relevant and impactful in real-world applications.

Disclosure statement

The author declares no conflict of interest.

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