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Practical Exploration of Interdisciplinary Integrated Teaching Models in Basic Education

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ABSTRACT
Guided by the cultivation of core competencies, basic education is undergoing a paradigm shift from knowledge transmission to ability development. As a key approach to break the constraints of subject-centrism, interdisciplinary integrated teaching aims to promote the reconstruction of students' cognitive structures and the development of comprehensive thinking through the relational construction of cross-disciplinary knowledge. This paper adopts a literature review and practical case analysis method to explore the practical value and effective implementation paths of interdisciplinary integrated teaching models in basic education. The results show that this teaching model can construct cross-domain collaborative paths for core competency implementation and realize the value-added of teaching resources through structural integration; its effective implementation requires drawing disciplinary knowledge association maps, developing targeted curriculum resources, formulating multi-dimensional quantitative evaluation standards, and organizing in-depth thematic teaching and research. This study provides a theoretical and practical reference for improving the quality of basic education and cultivating compound talents.

KEYWORDS
Basic education; Interdisciplinary integration; Teaching model; Core competencies; Practical paths

1 Introduction

The essential mission of basic education is to cultivate complete individuals adaptable to the future society, and interdisciplinary integration is an educational practice aligned with this mission. With the new curriculum standards emphasizing interdisciplinary learning, breaking subject boundaries and reconstructing teaching logic have become an inevitable trend for the high-quality development of basic education. Interdisciplinary integration is not a simple superposition of knowledge but an integration of disciplinary thinking modes based on real problem scenarios. It effectively stimulates students' learning initiative and promotes the development of innovative thinking and practical abilities [1].

Currently, in practice, interdisciplinary teaching still faces challenges such as incomplete implementation frameworks, inefficient resource integration mechanisms, and ambiguous evaluation systems. These problems lead to superficial integration and difficulty in achieving the goal of competency cultivation. Therefore, exploring a scientific and feasible interdisciplinary integrated teaching model is of great practical significance for enhancing the educational quality of basic education and promoting the all-round development of students.

2 Practical Value of Interdisciplinary Integrated Teaching Models in Basic Education

2.1 Construction of Cross-domain Collaborative Paths for Core Competency Implementation

The cultivation of core competencies in basic education has long faced the dilemma that a single subject cannot sustain comprehensive development. Core competencies, such as critical thinking and practical ability, are inherently comprehensive and systematic, which cannot be fully cultivated through fragmented teaching in a single subject [2]. Interdisciplinary integrated teaching provides a concrete implementation approach for competency cultivation through collaborative design across subject boundaries.

This model takes the internal logic of competency development as the basis, decomposes abstract core competencies into perceptible and trainable teaching objectives, and uses the organic connection of cross-domain knowledge and method interoperability to enable students to achieve holistic competency growth in comprehensive learning. Its core value lies in breaking the fragmented limitations of traditional teaching on competency cultivation, translating core competencies from the conceptual level into specific teaching behaviors and learning outcomes, and highlighting the practicality and systematicness of competency cultivation. For example, the cultivation of "scientific inquiry ability" can be realized through the integration of science, mathematics, and Chinese: students collect and analyze data in science and mathematics, and express research results in Chinese, forming a complete chain of competency development.

2.2 Practical Exploration of Structural Integration for Teaching Resource Value-added

Traditional teaching resources have inherent flaws such as disciplinary fragmentation and single functionality. Textbooks, teaching aids, and other resources are designed around a single subject, making it difficult to support comprehensive learning activities [3]. In contrast, interdisciplinary integrated teaching activates the potential of multiple values through the structural reorganization of resources from different disciplines.

This integration is not a simple pile-up of resources but a relational reconstruction based on teaching goals, transforming scattered knowledge, method, and situational resources into a synergistic teaching resource system. For example, integrating natural science experimental equipment with Chinese observation diaries, and mathematical statistical tools with geographical field investigation tasks, enables a single resource to exert multi-dimensional teaching benefits. Developing and utilizing resources from an interdisciplinary perspective not only expands the application boundary of teaching resources but also realizes in-depth exploration of resource value, providing solid support for enriching and deepening teaching activities and promoting the transformation of teaching resources from "stock utilization" to "incremental creation".

3 Effective Implementation Paths of Interdisciplinary Integrated Teaching Models in Basic Education

3.1 Drawing Disciplinary Knowledge Association Maps to Clarify Integration Context

The in-depth advancement of interdisciplinary integration is often hindered by the fragmentation of knowledge systems, resulting in superficial integration of different disciplines without inherent logical connections [4]. Teachers should take the initiative to break subject boundaries, systematically sort out the internal connections of knowledge from different disciplines based on the main objectives of integrated teaching, and transform scattered knowledge points into visual association maps by exploring the logical relationships behind knowledge and extracting common thinking methods.

This process requires teachers to accurately identify the essential characteristics of integration points, build thinking bridges between disciplines, clarify integration directions and specific paths, and provide accurate logical support for subsequent teaching. For the integration of mathematics and geography in junior high school, practical activities can be carried out around the "practical application of scales". Teachers focus on the internal connection between the geographical practical task of "regional map drawing" and the mathematical "scale calculation". Students are guided to sort out key elements of map drawing in geography and connect them with mathematical scale knowledge, then mark the corresponding relationships in the map template. After completing the map, students complete the task of "drawing a distribution map of key community facilities" to apply the integrated knowledge.

3.2 Developing Interdisciplinary Integrated Curriculum Resources for Precise Supply

Curriculum resources are an important foundation for interdisciplinary integrated teaching. Existing resources mainly based on a single subject are difficult to meet the requirements of in-depth integration and tend to make teaching activities superficial. Teachers should proactively find teaching materials from daily life according to students' cognitive development levels and key points of interdisciplinary integration, integrate core knowledge and thinking methods of different disciplines, and develop integrated curriculum resources with reasonable structures and prominent pertinence.

For the integration of science and Chinese in primary school, a "multi-dimensional plant growth record package" can be developed. The package includes scientific observation scales, Chinese writing aids, and interdisciplinary task sheets. Each student is assigned an observation plant, and different resource support is provided according to their cognitive levels. During practice, teachers adjust the difficulty of auxiliary tools in real time based on students' performance, such as supplementing "examples of transformation between scientific terms and literary rhetoric" to solve the problem of incoherent expression, enabling students to improve both scientific observation ability and Chinese expression ability.

3.3 Formulating Multi-dimensional Quantitative Evaluation Standards for Interdisciplinary Teaching

Without uniform measurement standards, interdisciplinary integrated teaching is prone to unclear evaluation and ambiguous orientation, which directly affects the improvement of teaching quality. Based on the core objectives of interdisciplinary teaching, teachers should construct operable quantitative evaluation standards for key aspects such as the degree of disciplinary competency integration, knowledge application ability, and thinking transfer level.

For the integrated teaching of "mathematical data statistics and moral and legal public participation" in junior high school, quantitative standards are formulated as follows: mathematics accounts for 65 points (20 points for data collection completeness, 25 points for statistical method standardization, 20 points for data analysis rationality); moral and legal

education accounts for 35 points (15 points for public problem extraction accuracy, 20 points for solution feasibility). Before teaching, teachers explain the standards to students, who then conduct data collection and analysis on "campus waste classification" and put forward optimization suggestions. After teaching, teachers score according to the standards and record problems in interdisciplinary connection to provide references for teaching improvement.

3.4 Organizing In-depth Thematic Interdisciplinary Teaching and Research to Improve Competencies

Interdisciplinary integrated teaching requires teachers to break the knowledge limitations of a single subject and possess the ability to integrate multi-disciplinary knowledge and design coherent teaching activities. It is difficult for teachers to fully grasp the core logic and implementation key points through independent exploration alone. They need to build a communication platform through thematic in-depth teaching and research, and jointly analyze teaching difficulties, integrate teaching resources, and sort out teaching processes with teachers from different disciplines.

Taking the interdisciplinary teaching and research theme of "the propagation of sound in physics and the creation of artistic conception in Chinese literary works" as an example, Chinese and physics teachers jointly study the classic prose Spring and sort out sound description sentences, then combine physical knowledge such as sound propagation conditions to determine teaching objectives. During the teaching and research, teachers of both disciplines share professional knowledge and jointly design teaching steps: literary reading, physical experiment demonstration, and practical appreciation tasks. They also predict potential problems (e.g., overly abstract physical knowledge) and formulate solutions to ensure the natural integration of disciplines.

4 Conclusion

The practical exploration of interdisciplinary integrated teaching in basic education is essentially a process of transforming the educational paradigm from "disciplinary fragmentation" to "collaborative symbiosis". It not only provides path support for the in-depth empowerment of students' core competencies but also promotes the optimization of the basic education curriculum system and the innovation of teaching methods. Interdisciplinary integration needs to be based on students' growth needs, strengthen the relevance of knowledge and the authenticity of scenarios in curriculum design, and improve guarantee mechanisms such as teacher collaboration and resource integration in practice. In the future, only by continuously deepening the understanding of the essence of integration and breaking through practical collaboration barriers and evaluation dilemmas can interdisciplinary teaching become a solid foundation for promoting the high-quality development of basic education and cultivating compound talents.

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