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Research on the Development of Interdisciplinary Theme Teaching in Middle School

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Abstract

In recent years, there has been a significant increase in research on interdisciplinary teaching. This paper combines the origin, connotation, classification, and related research on interdisciplinary teaching to explore the prospects for interdisciplinary theme teaching in middle schools: Firstly, it closely combines theory and practice to ensure that the interdisciplinary teaching concept is effectively applied in actual teaching. Secondly, it emphasizes enhancing teachers' interdisciplinary teaching ability and provides them with necessary training and support to better guide students in interdisciplinary learning. Finally, it actively enriches and shares interdisciplinary teaching resources to break down information barriers and promote the widespread circulation of high-quality educational resources.

Keywords

Interdisciplinary, Thematic teaching, Development research.

1. Introduction

Interdisciplinary theme teaching integrates knowledge, skills, and methods from different subjects to guide students in solving complex problems and improving their overall comprehensive abilities. This teaching method helps students better understand the meaning and application scenarios of knowledge, broaden their thinking horizons, and improve their problem-solving abilities.Through searching relevant literature on China National Digital Library, China Knowledge Network, Wanfang data, Web of Science and other databases, it was found that there have been abundant relevant research results on "interdisciplinary" in the academic community in recent five years, and the number of related literature publications has been increasing year by year. Especially in the field of education, literature research results on "interdisciplinary" have received more and more attention in the academic community. According to the existing literature achievements in China and other countries, this paper reviews the development status of interdisciplinary theme teaching in order to explore the development prospects of interdisciplinary theme teaching in middle schools. Its specific content is roughly divided into four aspects: the origin and development of interdisciplinary theory, the connotation and classification of interdisciplinary theory, interdisciplinary teaching and interdisciplinary theme teaching.

2. The Origin and Development of Interdisciplinary Studies

In the first half of the 17th century, French mathematician René Descartes used algebraic language to describe geometric figures, fully reflecting the interdisciplinary integration of geometry and algebra. In the 70s of the 19th century, Russian scientist Lavrentiev used physical methods to solve chemical problems. Subsequently, Dutch chemist Van't Hoff and others

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established a new independent interdisciplinary branch of science, including chemical thermodynamics, chemical kinetics, and electrochemistry. In the mid-1920s, several projects, such as the radar developed by MIT in the United States, the controlled nuclear fission research conducted by the University of Chicago, promoted extensive interdisciplinary and interdepartmental cooperation among scientists in the same field. In September 1970, the first International Symposium on Interdisciplinary Problems was held at the University of Nice in France, and the book "Interdisciplinarity and Higher Education" published after the conference provided a systematic discussion on the definition of interdisciplinary studies, the methods of interdisciplinary studies, the design and management of interdisciplinary studies, and interdisciplinary education. In 1990, American professor Klein published the monograph "Interdisciplinarity: History, Theory, and Practice," marking the entry of interdisciplinary theory into a new phase of development.

3. The Concept and Classification of Interdisciplinary Studies

Research on interdisciplinary connotation. American psychologist Robert K. Sessions Woodworth believes Interdisciplinary research refers to practical activities that cross known disciplinary boundaries and involve two or more disciplines. American scholars Diana Roten, Mark Chun and other scholars in their book "Interdisciplinary Education at Liberal Arts Institutions," argue that interdisciplinary studies is a course design and teaching model in which a single teacher or teacher team identifies, evaluates, and integrates knowledge, materials, techniques, tools, perspectives, concepts, or theories from two or more disciplines to enhance students' ability to analyze, understand, and creatively use multidisciplinary knowledge to solve problems. [1] American scholars Sally W. Aboelela et al. in "Defining Interdisciplinary Research: Conclusions from a Critical Review of the Literature" propose that the core of interdisciplinary research lies in constructing a conceptual model that effectively connects and integrates the theoretical frameworks of the studied disciplines. [2] This research approach also emphasizes the need to integrate perspectives and skills from various relevant disciplines at all stages of research.

Research on interdisciplinary classification. German scholar Heckhausen in his book "Interdisciplinarity: Problems of Teaching and Research in Universities" mentions that interdisciplinarity can be categorized into six types based on facts and practices, namely, arbitrary interdisciplinarity, pseudo-interdisciplinarity, auxiliary interdisciplinarity, synthetic interdisciplinarity, augmentative interdisciplinarity, and integrative interdisciplinarity. [3] French scholar Boissau in the book "Information space: A framework for learning in organizations, institutions and culture" from the perspective of form, interdisciplinary research is divided into three categories.: linear interdisciplinary studies, structural interdisciplinary studies, and constrained interdisciplinary studies. Belgian scholar Auboostel, from the perspective of science and operations research, divides interdisciplinary studies into subdisciplines, disciplines, and transdisciplines.

4. Research on Interdisciplinary Teaching

The study on the value of Interdisciplinary Teaching. Romanian scholars M. Florentia et al. proposed in their paper "Development of Them-based, Interdisciplinary, Integrated Curriculum: A Theoretical Model" that interdisciplinary teaching can cultivate students' ability to explore and observe the complex world with a connected perspective. [4] American scholar Hanna, L.A. in her book "Unit Teaching in the Elementary School" thinks that Interdisciplinary teaching can effectively solve the problems caused by the divided curriculum, such as the isolation of curriculum, the learning and practical application of knowledge, the disconnection between students and social life. [5] In their jointly authored book "Curriculum Integration," American

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scholars Beane and Jacobs argue thatInterdisciplinary teaching is conducive to forming a comprehensive view of overall planning. It not only focuses on the integration of the contents of the whole subject, but also takes into account the organic integration of curriculum objectives, implementation and evaluation.

Research on interdisciplinary instructional design. German scholar Dreyke provided teachers with an operational workflow for conducting interdisciplinary instruction. In his book "Meeting Standards Through Integrated Curriculum," he pointed out that Interdisciplinary teaching should BE designed in combination with curriculum standards under the framework of "KNOW/DO/BE". [6] American scholar Robert Klafkow in his book "Guide to Interdisciplinary Theme-based Teaching in Primary and Secondary Schools" suggests that when setting interdisciplinary theme-based teaching objectives for primary and secondary schools, four key elements are focused: Audience, Behavior, Condition and Degree of expect performance.

By combing the literature, it can be seen that many countries around the world have started interdisciplinary research early and have already formed a complete interdisciplinary theory. Subject teaching has provided beneficial environments and opportunities for cultivating students with innovative consciousness and problem-solving abilities by reforming the course framework, standardizing the operational process, and enhancing the teaching design. It has also provided feasible references for interdisciplinary education activities of middle school teachers.

5. Related Research on Interdisciplinary Theme-based Teaching

Research on interdisciplinary studies in China began in the 1980s, covering over 40 different fields. In the process of promoting interdisciplinary education practices, China has fully considered the uniqueness and development needs of middle school students and advocates integrating the concept of interdisciplinary teaching with the thematic teaching model to creatively build a cross-disciplinary thematic teaching model that is both suitable for China's educational reality and effective in promoting students' comprehensive competence. It can be said that the interdisciplinary thematic teaching is a teaching model that China pioneered based on its actual educational situation, providing valuable experience for the development of education worldwide.

5.1. Research on the connotation of interdisciplinary theme teaching.

Zhao Qingxiu proposed in her study on "Practical Research on Interdisciplinary Thematic Teaching" that interdisciplinary thematic teaching refers to the curriculum practice activities that combine two or more disciplines and organize teaching around a common theme. All disciplines cooperate with each other, and finally reach or surpass the original curriculum objectives. Ren Xuebao in "The Connotation, Dilemmas, and Breakthrough of Cross-disciplinary Theme-based Teaching" pointed out that cross-disciplinary theme-based teaching is a teaching approach that takes into account the "interdisciplinarity" of teaching perspectives and the "thematic coordination" of teaching models, while adhering to the discipline-based standpoint and breaking down the boundaries of disciplines. It integrates the content of two or more subjects, and uses the central theme to coordinate the elements of teaching purpose, content, resources, methods and evaluation. It takes the problem as the guidance to carry out the overall design and implementation, and promotes the students to realize the all-round development in the meaning construction. Luo Shengquan, Huang Peng, and other scholars believe in their paper "Systematic Design and Practical Approaches for interdisciplinary Theme-based Teaching" that cross-disciplinary theme-based teaching is a teaching practice that integrates knowledge, skills, values, and ways of thinking from other disciplines to solve complex problems in real-life situations and aims to cultivate students' interdisciplinary literacy.

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5.2. Research on the essential characteristics of interdisciplinary theme teaching.

Wu Xiaonan and Wang Fei in "Conceptual Definition, Essential Characteristics, and Practical Approaches of Interdisciplinary Thematic Teaching under the New Curriculum Standards" believe that the essence of interdisciplinary thematic teaching is to adhere to the "knowledge" origin of subject disciplines, transcend the "interdisciplinary" orientation of single disciplines, integrate the "theme" intent of disciplines and life, pursue the "practice" essence of interdisciplinary teaching that emphasizes "learning by doing", and become the "learner" subject that experiences problem-solving. Wang Pei and Huang Youchu in "The Desirable Direction and Implementation Suggestions of Interdisciplinary Theme-based Teaching" pointed out that the essential characteristics of interdisciplinary theme teaching are mainly reflected in the interdisciplinarity and theme coordination. Li Xuhua and other scholars in "Interdisciplinary Theme-based Teaching: Basic Concepts, Value Dimensions, and Design Pathways" propose that the essential features of interdisciplinary theme-based teaching include the establishment of interdisciplinary themes that transcend individual disciplines, the content of interdisciplinary theme-based teaching that breaks down barriers between disciplines, and the problem-oriented context setting of interdisciplinary theme-based teaching.

5.3. Research on the practical path of interdisciplinary theme teaching.

Mu Yaojia and Liu Chunqiong proposed in "Key Issues and Practical Pathways of Interdisciplinary Thematic Teaching Design" that the practice of interdisciplinary thematic teaching design should follow the following principles: build a interdisciplinary teacher community, focus on students' life contexts, and rely on students' practical activities. Liao Jingxi and Yang Juan in "The Knowledge Dilemma and Path Optimization of Interdisciplinary Theme Teaching" believe that high-quality interdisciplinary theme teaching activities require enhancing holistic cognition, conducting holistic teaching; Adhering to the unity of knowledge and practice, paying attention to situation guidance; and promoting integrated education to seek the return of the educational ecology. Li Xuhua, Feng Chunyan pointed out in "Interdisciplinary Theme-based Teaching: Basic Concepts, Value Dimensions, and Design Pathways" that interdisciplinary theme-based teaching should set themes based on real situations; take a multi-dimensional perspective, clarify teaching objectives; construct knowledge network skillfully by concept command; construct knowledge network by using concept command; and set up teaching evaluation based on multiple understanding.

5.4. The progress of interdisciplinary theme teaching in middle school education

In the article "Practical Exploration of Interdisciplinary Subject Teaching of Geography, Biology and Chemistry in Junior High School -- Taking "Water and Life" as an Example", Xing Xiaoming takes the requirements of key abilities and essential qualities as the teaching objectives to help students form superior concepts and improve their ability to solve real problems, civic awareness and social responsibility. Su Chuanqing and Zhan Xiaohong argued in their article "Exploration of Interdisciplinary theme Teaching Design in Chemistry Curriculum -- Taking Fingerprint Solving Cases as an example" that interdisciplinary theme teaching should focus on cultivating students' interdisciplinary ability. In order to test the effect of this goal, educators can follow the guiding concept of "teaching, learning and evaluation" integration in classroom teaching. In the article "Teaching design of interdisciplinary topics in senior high school mathematics from the perspective of core literacy -- taking '12 hours after Drinking' as an example", Liu Jialai and Wei Yu take mathematics as the main line of interdisciplinary subject teaching, and integrate the relevant contents of biology, chemistry and law to help students think about the real world with innovative thinking, so as to enhance students' ability to

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discover, raise, analyze and solve problems. Gao Xiao in his research paper "Exploration of Interdisciplinary Theme Teaching in Middle School History under the New Curriculum Standards," skillfully combines history with subjects such as Chinese, art, and geography. By carefully designing teaching activities, students can analyze historical events from multiple perspectives, and they can also expand their knowledge and broaden their learning horizons. Yu Xingyan and Zhang Lei pointed out in "The dilemma and solution of high quality interdisciplinary theme teaching for PE teachers in primary and secondary schools" that in order to solve the problem of the difficulty of implementing interdisciplinary theme teaching, schools, families and society should strengthen the organization, form a joint force, improve the institutional guarantee system, and promote the normal development of interdisciplinary theme teaching.

6. Prospects for the Development of Interdisciplinary Theme Teaching

In the current global educational reform trend, interdisciplinary thematic teaching, which serves as a key approach to cultivating students' comprehensive qualities, innovative thinking, and problem-solving abilities, is increasingly receiving widespread attention from both academia and the education community. Based on the above literature, the following prospects can be made for the development of interdisciplinary thematic teaching in middle schools: First, with the continuous maturity and improvement of interdisciplinary theory, interdisciplinary thematic teaching in middle schools will pay more attention to the deep integration of theory and practice in the future. Second, the effective implementation of interdisciplinary thematic teaching is inseparable from a high-quality teacher team. In the future, middle school education will increase its efforts to cultivate teachers' interdisciplinary literacy, improve teachers' interdisciplinary teaching ability and curriculum design ability through professional training, building exchange platforms, and encouraging teachers to participate in interdisciplinary research projects. Third, the enrichment and sharing of teaching resources will become an important driving force for the development of interdisciplinary thematic teaching in middle schools. On the one hand, teaching resources can be provided for teachers and students through the construction of interdisciplinary teaching resource libraries and the development of high-quality interdisciplinary teaching cases. On the other hand, the sharing and exchange of teaching resources can be realized through internet platforms, promoting cooperation and mutual assistance between different regions and schools, and jointly improving the quality and effect of interdisciplinary thematic teaching. In summary, interdisciplinary thematic teaching has great prospects in the areas of exploration and development.

7. Conclusion

Scholars engage in interdisciplinary research, initially in response to complex real-world problems, and then as society evolves and knowledge systems continue to expand, the research has gradually developed and expanded. In the field of education, especially in the stage of middle school education, interdisciplinary theme teaching has shown its unique advantages and potential in improving students' comprehensive quality and discipline accomplishment, and has become a new vane of education and teaching reform. Interdisciplinary teaching not only meets the demand of basic education for innovative educational ideas, but also becomes a key way to cultivate students' all-round development and innovative ability. Therefore, facing the future development of education, we should continue to deepen the research and practice of interdisciplinary theme teaching, and build a more solid platform for the growth and development of students.

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