Research on the Integration of Curriculum Design and Interdisciplinary Teaching Based on Subject Characteristics

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Abstract: In the current wave of social change and technological development, the education system is facing profound changes, and the integration of curriculum design and interdisciplinary teaching based on subject characteristics is particularly important in this change. The purpose of this paper is to explore the integration and innovation of curriculum design and interdisciplinary teaching based on subject characteristics. By analyzing the challenges of the traditional discipline education model, it is found that knowledge explosion and information overload, comprehensive literacy and interdisciplinary needs, and lack of vocational skills and practical experience are important problems in current discipline education. Therefore, this paper proposes a series of curriculum design strategies based on subject characteristics from the perspectives of in-depth exploration of core concepts and skills, emphasizing practical teaching and case analysis, and personalized learning and evaluation system. At the same time, this paper also puts forward suggestions for the integration and innovation of interdisciplinary teaching from the aspects of designing interdisciplinary theme learning modules, interdisciplinary practice challenges, interdisciplinary tutor system, and interdisciplinary teaching driven by social issues.

Keywords: Subject Education; Curriculum Design; Interdisciplinary Teaching; Inclusive Education

At present, the education system is undergoing profound changes under the impact of rapid social changes and technological development. However, the traditional model of subject education is lagging behind in adapting to this change. The boundaries between disciplines are blurring, and the comprehensive competencies required for problem-solving and innovation are becoming more prominent. Therefore, how to better carry out interdisciplinary teaching and cultivate students' comprehensive literacy and innovation ability has become one of the important research topics in the field of education [1].

1 The Challenges of the Times in the Traditional Discipline Education Model

1.1 Knowledge Explosion and Information Overload

The scientific and technological development of the times has led to an explosion of information, and the update of subject knowledge has been unprecedentedly fast. Traditional subject education is usually based on a static body of knowledge, but in the era of information explosion, students may be faced with massive amounts of information. The traditional model emphasizes the transfer of knowledge by teachers, but does not necessarily focus on cultivating students' ability to acquire and process information. Students need to have stronger self-directed learning and critical thinking skills in order to better adapt to the dynamic changes in knowledge [2].

1.2 Integrated Literacy and Interdisciplinary Needs

There is a growing demand for comprehensive literacy and interdisciplinary competence in modern society. The traditional discipline education model usually takes disciplines as the boundaries and lacks cross-integration between disciplines. However, in the workplace and in life, problem-solving often requires a multidisciplinary approach. The traditional academic education model is difficult to meet the needs of students in terms of innovation, teamwork, and cross-domain application, which is the competency that modern society values [3].

1.3 Lack of Vocational Skills and Practical Experience

Traditional subject education models tend to pay more attention to the imparting of theoretical knowledge, but lack of vocational skills and practical experience. As the demand for applied talents increases, students with only theoretical knowledge may face a competitive disadvantage in the job market. The challenges of the times require students to gain real-world experience through practical activities and apply what they have learned in real-world work. The traditional subject education model needs to pay more attention to cultivating students' practical ability to better adapt to the requirements of the workplace [4].

2 Curriculum Design Strategies based on Subject Characteristics

2.1 Dig Deeper into the Core Concepts and Skills of the Discipline

When designing a curriculum based on the characteristics of the discipline, it is necessary to first clarify the core objectives and key concepts of the discipline, covering the basic theories, methodologies and practical skills. For example, in the mathematics curriculum, the core goal of the subject is to develop students' logical reasoning and problem-solving skills. In order to achieve this goal, curriculum design needs to carefully select the teaching content, ensure that the core concepts of the subject are covered, and organically connect the different levels of subject knowledge, so as to rationally organize the knowledge structure and enable students to gradually establish an overall understanding of the subject system. Such a strategy helps to dig deeper into the essence of the subject and improve students' understanding and mastery of the subject.

2.2 Emphasis on Practical Teaching and Case Analysis

Secondly, the curriculum design based on the characteristics of the discipline emphasizes practical teaching and case analysis, especially in the applied disciplines, and strengthens the practical teaching through experiments, field trips, simulation operations, etc., which can enable students to have a deeper understanding of subject knowledge and cultivate the ability of practical application. In humanities, social sciences and other disciplines, the use of case studies to connect abstract theories to real-world situations stimulates students' interest, helps to develop students' analytical thinking and problem-solving skills, and enables them to better understand the application of the discipline in real life. This comprehensive teaching method enables students to not only acquire theoretical knowledge, but also to flexibly apply what they have learned to improve their ability to apply the subject in practice [5].

2.3 Personalized Learning and Evaluation System

In addition, the construction of personalized learning and evaluation system is also very important in the curriculum design based on subject characteristics. Due to the characteristics of the subject, there may be differences in students' understanding of different knowledge points and learning rhythm, which is the common "partial phenomenon". Therefore, in the course design based on the characteristics of the subject, the use of personalized learning strategies to arrange the difficulty of the content can provide diversified learning resources and methods for students at different levels to meet the personalized learning needs of different students. On this basis, the evaluation system of different disciplines also needs to be close to the actual requirements of the discipline, and introduce diversified evaluation methods, including not only traditional examinations, but also project evaluation, work display, practice reports, etc., to comprehensively evaluate students' knowledge mastery and ability development from multiple perspectives, better reflect the characteristics of disciplines, and promote students' all-round growth in personalized learning.

3. Integration and Innovation of Interdisciplinary Teaching

3.1 Design Interdisciplinary Thematic Learning Modules

Through the creation of thematic learning modules that integrate different disciplines, students are exposed to multiple subject areas in a single project. In the case of sustainable urban development, students can participate in projects that cover a variety of disciplines such as geography, environmental science, sociology, and engineering. This model of learning helps to stimulate students' interest and develop interdisciplinary thinking, while providing a more comprehensive subject knowledge that

enables them to integrate concepts and skills from various disciplines in real-world problems. The design of this integrated module can enable students to develop a more integrated perspective in subject learning, laying a solid foundation for future further education and career development.

3.2 Interdisciplinary Practical Challenge

To promote innovation in interdisciplinary teaching, we can try to hold interdisciplinary practice challenges. In the challenge, students will be confronted with real-world problems involving knowledge and skills from multiple disciplines, requiring them to apply an interdisciplinary mindset to analyze and solve them in a teamwork environment. Through this process, students will be stimulated to discover problems and innovate solutions, thus developing innovative thinking. This practical challenge not only improves students' ability to solve complex problems, but also develops their skills to work collaboratively in an interdisciplinary environment. In addition, the Interdisciplinary Practical Challenge can also provide a stage for students to showcase and share their comprehensive abilities. Through the competition, students will have the opportunity to prove their acquired interdisciplinary knowledge and skills in real-world situations, and continuously improve from the feedback of peers, judges, and tutors, so as to cultivate students' more comprehensive and in-depth comprehensive literacy, and lay a solid foundation for their future studies and careers.

3.3 Interdisciplinary Mentorship

The introduction of interdisciplinary tutor system is one of the innovative strategies to promote interdisciplinary cooperation and comprehensive development of students. The design of the interdisciplinary tutor system can help to make up for the lack of boundaries between disciplines in the traditional discipline education model. Students are no longer limited to the perspective of a single subject tutor, but are able to access professional advice from different fields within an interdisciplinary team of tutors. This multi-faceted mentorship helps students understand the problem more comprehensively and develop interdisciplinary thinking. At the same time, the exchange and cooperation between the interdisciplinary tutor teams can share the latest educational content of

their respective disciplines, and jointly discuss how to better integrate the knowledge of different disciplines to better guide students. This collaboration helps to break down the barriers between disciplines, prompts tutors to better understand each other's teaching philosophies, and improves the teaching level of the entire tutor team.

3.4 Interdisciplinary Teaching Driven by Social Issues

The introduction of social problem-driven interdisciplinary teaching can stimulate students' interest in and application of multidisciplinary knowledge by integrating real-world social problems into subject teaching. By being driven by social issues, such as studying climate change, students are able to study in depth in different subject areas, including meteorology, ecology, political science, and more. In this interdisciplinary learning environment, students will not only focus on the surface of the problem, but also delve into the core concepts and theories of the various disciplines involved. This practical problem-solving approach enables students to establish a more comprehensive understanding of subject knowledge, so as to better cope with the complex and ever-changing social challenges of the future. Socially problem-driven, interdisciplinary teaching helps develop students' practical skills and problem-solving mindset. By combining theoretical knowledge with practical problems, students will be more likely to understand the practical application of subject knowledge, while also developing skills such as teamwork, innovation, and critical thinking in the process of problem solving.

4. Conclusion

The integration of curriculum design and interdisciplinary teaching based on subject characteristics has important significance for the development of modern education system. For subject teaching, curriculum design and interdisciplinary teaching based on subject characteristics can help students deeply understand the core concepts and skills of each discipline, realize the organic integration of knowledge, complete the cultivation of comprehensive literacy, improve comprehensive application ability, and ultimately promote the comprehensive development of students in different fields.

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