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Research on Interdisciplinary Integration and Innovative Practice of Regional Master Teacher Studios

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Abstract: The regional master teacher studio is a growth community that nurtures regional teachers. It has the characteristics of being interdisciplinary and leading, which is conducive to building a high-quality and professional teaching staff. As the vanguard of educational innovation, it shoulders the mission of exploring new teaching models and promoting high-quality development of education. It should be rooted in local characteristics, break down disciplinary barriers, and take innovative collaboration mechanisms as the key point to carry out in-depth practical exploration of interdisciplinary integration. Based on this, this paper conducts research on the cross-disciplinary integration and innovation practice of the regional master teacher studio, systematically sorts out the practice path, explores the deep value and development path behind it, and provides useful references for educational reform in the new era.

Keywords: Regional master teacher studio; Interdisciplinary integration; Innovative practice

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1. Introduction

In the current wave of educational reform, master teacher studios are playing an increasingly important role as an important platform for promoting educational innovation and facilitating the professional growth of teachers. Through precise expert diagnosis and high-end guidance, gain a comprehensive understanding of the latest developments and trends in technology education, and use resources intelligently in educational practice to open up innovative thinking; Through project cases to drive teachers to condense and summarize experiences, stimulate the enthusiasm for innovation and practical drive of more education peers, and promote the sustainable construction and development of master teacher studios.

2. Innovative practice and value exploration of cross-disciplinary integration in regional master teacher studios

2.1. Building a new pattern of interdisciplinary education rooted in local characteristics

The studio focuses on the unique humanistic and geographical background of Xinjiang, explores the historical background of Xinjiang's reclamation and border defense, incorporates local cultural elements, and organically integrates with science and technology, labor, and science education to form various subject learning platforms with local characteristics [1]. Specifically, in combination with a unique set of karez water conservancy projects in Xinjiang, project learning with the theme of "the collision of ancient wisdom and modern technology" will be launched, and traditional irrigation projects will be designed with computer-aided mapping and improved with current advanced water-saving measures. With the assistance of the teachers of this major, the studio has brought together 12 teachers from 12 schools across Xinjiang to create and share, inherit and carry forward the excellent traditional culture of our country [1]. The "Silk Road Creativity" series of courses aims to create cultural and creative products with local cultural characteristics by understanding and studying the traditional patterns of various cultures and applying modern laser engraving technology. Such practical training not only enhances students' skills and qualities but also deepens their understanding of China's fine traditional culture, providing a new perspective for the full implementation of the fundamental task of fostering virtue and nurturing talent [2].

2.2. Innovating the collaborative mechanism to create a new model for educational development

Based on the "Tianshan Talents" education and teaching master training program of the autonomous region, a cross-regional and cross-provincial education alliance has been established, including six base schools in cities such as Urumqi, Korla, and Aksu, and long-term cooperation with outstanding teacher workshops in Guangzhou, Fuzhou, and other places. Under the guidance of systematic curriculum design and thematic workshops, disciplinary boundaries have been broken and resources have been shared [3]. Regularly hold the Silk Road GLS Education Innovation Forum, where G represents general technology; L represents laboring education; and a series of activities under the theme of S: Science Education, inviting teachers to conduct interdisciplinary research on issues such as technology inheritance and technological change. Taking "Smart Agricultural Greenhouses" as an example, teacher teams from various regions jointly carry out projects. Xinjiang teachers, based on local agricultural practices, and coastal teachers, based on Internet of Things technology applications, together form such a complete project-based curriculum system. In such an innovative way, students' basic subject skills and creativity were cultivated (the number of student science and technology invention awards in the school increased by 10% after the completion of the course), teachers' professional growth was promoted (the proportion of participating teachers winning awards increased by 15%), and a positive interactive trend of "curriculum integration–resource sharing–coordinated development" was formed. After three years of practical exploration, the model has been extended to three schools across Xinjiang, trained 16 interdisciplinary backbone teachers, and developed six sets of characteristic school-based curriculum resource packages, providing a replicable and scalable practical model for the high-quality development of regional education [4].

3. Innovative practice of interdisciplinary education under policy guidance

In accordance with the requirements of policy documents such as the Ministry of Education's "Opinions on Comprehensively Strengthening Labor Education in Primary, Secondary and Higher Education Institutions in the New Era" and the "General Senior High School Curriculum Plan (2017 Edition, Revised in 2020)," the

studio conducted an in-depth analysis of the actual needs of education development in Xinjiang and found that traditional single-subject teaching has become difficult to meet the needs of cultivating students' core literacy [5]. A series of policy documents issued by the state in recent years, such as labor education and science and technology innovation education, especially the Implementation Outline of Patriotic Education in the New Era and the Overall Plan for Deepening the Reform of Education Evaluation in the New Era, have provided a clear direction for the integrated development of education [6]. The studio, in light of Xinjiang's regional characteristics and the actual situation of the school, has developed a three-level integrated interdisciplinary curriculum system of "basic courses + extension courses + characteristic courses" [7].

3.1. Policy orientation for clearly defining the path of integration

The studio organized teachers to systematically study national education policy documents such as the "Guidelines for Comprehensive Practical Activity Courses in Primary and Secondary Schools" and the "Compulsory Education Curriculum Plan and Curriculum Standards (2022 Edition)," and established a three-step implementation path of "policy interpretation–curriculum standards analysis–teaching transformation." By inviting experts from the Autonomous Region's Institute of Education and Science to conduct specialized training, we accurately grasped the policy orientation. The goal of integrating general technology, labor education and science education has been concretely defined as the "Five Ones" project: once a week for cross-disciplinary teaching and research, once a month for integrated teaching cases, once a semester for presentation of achievements, once a year for research topics, and once every two years for course updates [8]. The curriculum design focuses on the integration of policy requirements and local characteristics. For example, in the "intelligent agriculture" unit, not only was the agricultural production practice required by the labor education curriculum standards implemented, but the "smart farming" school-based curriculum project was also developed. By establishing a stratified and categorized course resource library, interdisciplinary teaching is ensured to be in line with the national education strategy and meet the individualized needs of students of different grades. Currently, two basic courses, three extension courses, and one research course have been formed.

3.2. Distinctive practices to promote innovative development

Based on the local cultural characteristics of Xinjiang, the studio delves deeply into local cultural resources and integrates local elements into interdisciplinary courses. For example, in the "Innovative Design of Ethnic Costumes" project, students will not only learn the weaving techniques of Edlais silk (labor education), but also master the pattern-making techniques of clothing (general technology) and study the chemical composition of dyes (science education) [9]. Through innovative teaching methods such as project-based learning and practical exploration, including organizing activities like the "Silk Road Science and Technology Culture Festival" and the "Campus Maker Marathon," students' interest in learning was stimulated, and the satisfaction rate of participating students reached 92%. This integrated practice not only enhances students' overall quality, with 56 awards won in various levels of science and technology innovation competitions in the past three years, but also explores an educational innovation path with regional characteristics. The "three-stage nine-step" teaching method (preparation stage–implementation stage–expansion stage) summarized and developed by the studio has been promoted and applied in three schools across Xinjiang, trained 29 interdisciplinary teachers and developed six characteristic teaching cases, providing strong support for cultivating high-quality talents of the new era [10].

4. New explorations of curriculum integration and system construction for nurturing new talents

The studio organizes regional and interdisciplinary training activities, emphasizing practicality and innovation. Teachers of general technology, labor education and science education jointly develop interdisciplinary courses and design challenging project tasks such as "Smart Home Design and Production with Local Characteristics" and "Campus Culture Nursery," fully considering the age characteristics and cognitive level of students, ensuring the suitability and feasibility of the content, and stimulating students' interest in learning and desire to explore [11].

4.1. Practice and literacy: The synergy of general technology and labor education in education

There is a natural fit between general technology and labor education in terms of educational value. From a practical perspective, general technology courses cultivate students' engineering thinking and technical application skills through technical practice activities such as design, production, and testing; Labor education, on the other hand, shapes the concept and quality of labor through daily labor that involves hard work. Together, they form an educational model of learning by doing, which enables students to improve their problem-solving skills in real situations. In terms of quality cultivation, project-based learning of general technology nurtures innovative design and teamwork skills, while labor education nurtures frugality and self-reliance through labor experience. The two work together to promote the all-round development of students' technical literacy, labor spirit, and overall quality.

4.2. Innovation and growth: A new interdisciplinary approach to education

The intrinsic connection between the two courses expands the path for students' innovation. General technology in innovation and entrepreneurship education focuses on the invention and creation of technology and problem-solving, while labor education focuses on creative labor practice. The combination of "technology + labor" can simultaneously stimulate students' inventive and innovative abilities [9]. From the perspective of the improvement of comprehensive abilities, the systematic thinking of technology is the theory of general technology, which can complement and strengthen the strong will of labor education, help students lay a solid foundation in science and technology and cultivate a correct view of labor, and cultivate compound builders with innovative skills and a spirit of labor. It can be said to be a comprehensive and all-round training.

4.3. The value of collaborative education in core competencies and interdisciplinary integration

General technology and science education are highly compatible in terms of educational value. From the perspective of core literacy cultivation, the technical awareness and engineering thinking emphasized in general technology courses and the scientific inquiry ability emphasized in science education support each other, forming a closed-loop training model of "technological innovation–scientific verification." In terms of interdisciplinary integration, the inherent comprehensive nature of general technology (covering multiple disciplines such as liberal arts and science, as well as fields like engineering and information) is highly consistent with the interdisciplinary learning concept advocated by science education. The combination of the two creates a three-dimensional knowledge application scenario for students, effectively enhancing their comprehensive ability to solve complex problems. This synergy not only fulfills the requirements of the national science education policy but also innovates the educational path of technology courses.

4.4. The path of integrating practical innovation with the cultivation of future talents

The two courses jointly develop the key abilities of future talents through practical teaching. The "design-production-test" teaching model of general technology complements the inquiry-based learning of science education in a methodological way, cultivating students' complete ability chain of "identifying problems–innovative solutions" in project practice [12]. The deep integration of the two is becoming an important practical carrier for implementing the science education strategy in the new era [12].

4.5. Multi-disciplinary integration: Building a new paradigm of comprehensive education for the future

The deep integration of general technology, labor education, and science education has significant contemporary implications. From the perspective of talent cultivation, the organic integration of the three precisely meets the diverse demand for technical and skilled talents in the future society. It is based on the combination of technical production, work experience, and scientific research to comprehensively cultivate students' innovative thinking, practical ability, and cross-cultural literacy, laying the foundation for students' future development in the field of science and technology engineering [13]. From the perspective of teaching, the deep integration of the three expands the implementation of the classroom: general technology design of the manufacturing process enhances the operational ability of materials; labor education exercises the will of perseverance; science education focuses on evidence-based reasoning. Together, the three form a circular training model of "hands-on–scientific thinking–labor creation." Such an integrated model not only expands the breadth of students' learning but also stimulates their enthusiasm for learning, and achieves the unity of knowledge and action, educating people with the effect of teaching, and expanding books with education as the basis. Students achieve all-round development in multiple abilities such as morality, intelligence, physical fitness, aesthetics, and labor, and form an overall educational pattern that meets the needs of future society.

5. Innovating teaching to expand the path and integrating practice to increase effectiveness

In the interdisciplinary practice of integrating labor education and science education in the general technology curriculum, we have innovated teaching models with diverse teaching methods at the core. Project-based learning enables students to grow through practice. For instance, in the design and production of the "Water Understands Flower Language" automatic watering device, students not only need to master the engineering design process but also complete the device by hands-on operation, achieving a double improvement in labor skills and engineering thinking. Inquiry-based learning, on the other hand, focuses on real-world problems, such as the problem of plant care in the classroom, which encourages students to actively explore the scientific principles behind the control system and deepen their understanding of the knowledge in the process of solving the problem. In addition, generative artificial intelligence such as Wenxin Yiyan and Zhipu GLM-4 are introduced to assist teaching. In sections such as pattern design, AI transforms abstract technical concepts into intuitive visual representations through intelligent demonstrations, helping students better understand key technical points and stimulating innovative thinking. These teaching methods work together to form a "learn by doing, create by research" teaching model, creating a more efficient learning environment for students [14].

6. Innovative practice and evaluation system construction of interdisciplinary integrated education

6.1. Practical education: Building an experiential learning ecosystem that is interconnected both inside and outside the school

By integrating on-campus studio and laboratory resources, establishing practice bases in collaboration with universities and enterprises, and creating distinctive projects such as the "Canton Tower" electronic production, students can grow in a real professional environment. Carry out practical activities such as science and technology innovation competitions and community services simultaneously, and cooperate with platforms such as science and technology exhibitions and achievement displays to form a closed-loop training model of "base construction–project practice–achievement display" to comprehensively improve students' overall quality.

6.2. Evaluation innovation: Establishing a multi-dimensional and three-dimensional developmental evaluation mechanism

Build a multi-dimensional evaluation system that includes process evaluation, peer evaluation, and achievement exhibition evaluation, with a focus on students' creative design, production process, and application value of achievements [15]. By promoting innovation and growth through evaluation, we will respect individual differences, stimulate innovation potential, and lay the foundation for students' all-round development and lifelong growth.

7. Conclusion

Based on Xinjiang's regional characteristics, we attach equal importance to cross-disciplinary and regional cooperation, and create an educational model of "general technology + labor education + science education" through policy guidance, classroom implementation, and practical teaching. We conduct innovative cross-disciplinary cooperation experiments, carry out in-depth exploration of local traditional culture, build new types of cooperation, and scientifically integrate various resources. In order to break through disciplinary barriers, the "learning-practice-creation" educational and teaching process is a path and method that can be generalized and applied to internalized learning of "virtue." The future studio team will achieve deeper cooperation on the basis of cross-disciplinary collaboration, further improve the assessment mechanism, increase communication and interaction among schools, within schools, and with various departments outside schools, promote high-quality educational and teaching work, and cultivate a new generation of young people of the times with technical thinking, labor spirit, and scientific knowledge.

Disclosure statement

The author declares no conflict of interest.

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