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Research and Practice of Multidisciplinary Interdisciplinary Practice Education Model Based on UAV Practice Course

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Abstract: In the dual context of higher education reform and innovation-driven development strategy, cultivating compound talents with interdisciplinary integration ability and practical innovation spirit has become the core task of college education. This study takes the course "Fundamentals of UAV Practical Application Technology" at North China Electric Power University as the practical carrier to explore a new path of multidisciplinary cross-integration of practical education. By building a four-dimensional curriculum system of "theoretical foundation-simulation training-practical innovation-industry-education integration", an interdisciplinary teaching team and a fully open practice platform are established to deeply combine UAV technology with the needs of the power industry to form a closed loop of "course-competition-industry". Practice shows that this model has effectively improved students' engineering practice ability and cross-border innovation ability, and the relevant achievements have won 6 national awards in discipline competitions and 6 incubation industrialization projects, providing a paradigm for multidisciplinary practice education in colleges and universities.

Keywords: Technical Basis of UAV Practice Application; Multidisciplinary; Practical Education; Integration of Industry and Education; Innovation Ability Training;

1. Introduction

With the wide application of the unmanned aerial vehicle (UAV) industry in civilian, commercial, military and other fields, it has become a new engine driving regional economic development. The rise of low-altitude economy in Guangxi and other places further highlights the vigorous vitality of this industry[1][2]. Uav technology covers the intersection of multiple disciplines such as aerospace, electronic information and artificial intelligence. The rise of the low-altitude economy has given rise to an urgent need for compound talents with multi-field knowledge and practical abilities. However, the gap between the current talent cultivation in vocational colleges and the industry's demands needs to be filled urgently[3]. In the era of new quality productivity, traditional occupations are transforming towards digital intelligence. How to cultivate innovative and entrepreneurial talents that adapt to the development of the unmanned aerial vehicle industry through educational reform It has become an important issue faced by vocational education[1].

In the current training of unmanned aerial vehicle (UAV) technology talents, there are widespread problems such as a single teaching mode, weak practical links, and course content lagging behind the development of the industry. The theoretical indoctrination teaching in traditional classrooms leads students to learn passively, with insufficient innovative spirit and practical ability, making it difficult to meet the requirements of enterprises for high-quality skilled talents[4][5][6].Although some explorations have been carried out in the teaching of unmanned aerial vehicle (UAV) majors in secondary vocational schools, higher vocational colleges and other institutions, problems such as insufficient cross-disciplinary integration and lack of innovation and entrepreneurship orientation still restrict the improvement of talent cultivation quality and prevent the full release of the educational value of UAV technology in education[7][8].

Therefore, it is of great significance to construct a multi-disciplinary cross-innovation and entrepreneurship education model based on unmanned aerial vehicle

(UAV) practical courses. This model is job demand-oriented, integrating project-based and task-driven teaching methods, and linking multi-dimensional classrooms such as course practice, comprehensive quality projects, and maker Spaces. It organically combines ideological and political elements with professional education[4][9][10]. By building industry-education integration training bases, it promotes the deep integration of unmanned aerial vehicle technology with disciplines such as communication, surveying and mapping, and artificial intelligence It can stimulate students' interest in learning, enhance their abilities of autonomous learning, practical innovation and interdisciplinary collaboration, and provide talent support for the sustainable development of the unmanned aerial vehicle industry[3][7][11].

2. Construction of a Practical Education System

2.1 The Design of a Four-Dimensional Integrated Curriculum System

This course takes "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology" as its core and constructs a four-stage progressive education system of "basic layer → ability layer → innovation layer → support layer", as shown in Figure 1. By integrating knowledge from multiple disciplines such as aerospace, automatic control, and computer science, and covering four major teaching modules including the structure and principles of unmanned aerial vehicles (UAVs), industry software applications, simulation and physical flight, and secondary development technologies, a full-chain training path of "cognition - skills - innovation" is formed, systematically solving the problems of disciplinary barriers and the disconnection between industry and education.

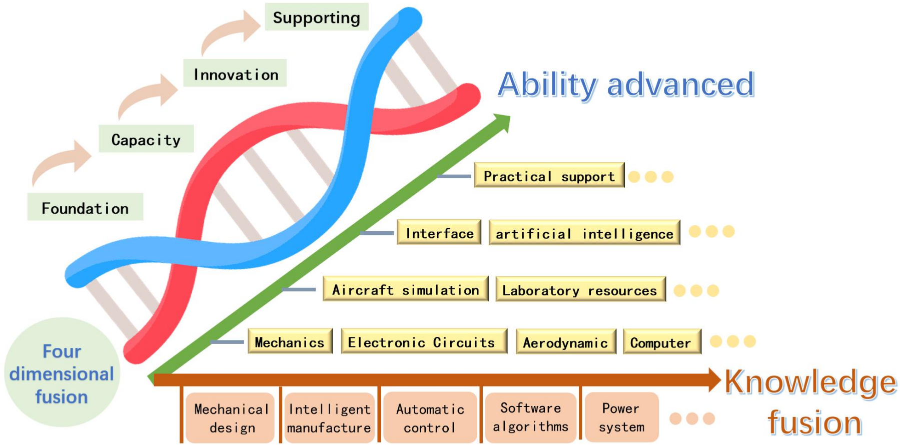

Figure 1. Diagram of the Training Mode of "Four-dimensional Integration" Engineering Innovation Talents

2.1.1 Foundation layer: integration of multi-disciplinary knowledge and theoretical foundation laying

The first stage of the course focuses on the teaching of unmanned aerial vehicle (UAV) structure and control theory, integrating the core principles of disciplines such as mechanical dynamics, electronic circuits, and aerodynamics. By updating teaching content through a dynamic knowledge base, the traditional fragmented disciplinary knowledge is reconstructed into an integrated knowledge system that serves the cognition of unmanned aerial vehicle systems, establishing a thinking framework for cross-domain problem analysis for students.

2.1.2 Competency layer dual-track simulation - practical operation to enhance engineering literacy

Relying on the resources of flight simulators and physical unmanned aerial vehicle laboratories, a dual-track training scenario of "virtual simulation → physical control" is constructed. Deepen the transformation from theory to skills in the simulation stage, and drive task-based learning through the assessment of route and path control. In the physical flight phase, enhance engineering practice capabilities such as spatial perception and emergency response. Take operational accuracy and process standardization as the core evaluation indicators to achieve a leap in "hand-brain coordination" capabilities.

2.1.3 Innovation layer: connection between technology extension and industrial application

Break through the limitations of basic operations and focus on introducing secondary development interface teaching and the extension of artificial intelligence technology, such as main obstacle avoidance and intelligent aerial photography. Students control the behavior of drones through programming and integrate computer vision, communication and navigation technologies in real cases such as mapping modeling and inspection analysis, cultivating their ability to solve complex engineering problems. This section closely aligns with the demands of the low-altitude economic industry chain, integrating enterprise development standards such as SDK protocols into teaching to promote the incubation of innovative achievements.

2.1.4 Support layer: construction of a resource ecosystem for industry-education collaboration

Taking the innovation laboratory of the Engineering Training Center as the physical hub, it integrates a dynamic, practical and standardized three-dimensional resource ecosystem: by continuously aggregating cutting-edge network technologies such as 5G communication and edge computing to update the teaching content library, it ensures that the knowledge system keeps pace with the evolution of industrial technologies. Relying on the open and shared software and hardware platform of the laboratory, a full-process practical support from industry software operation to hardware development and implementation is constructed. Deeply integrate the demands of the low-altitude economic industry chain, introduce enterprise-level aerial photography technical standards, SDK development protocols and typical application cases (such as inspection and mapping), and permeate industrial standards into secondary development teaching and project practice, forming a closed loop of "technology update - platform verification - industry connection", driving the transformation of teaching achievements into innovative applications.

2.2 Construction of Interdisciplinary Student and Teacher Teams

2.2.1 The multi-subject cross-disciplinary collaboration of the teaching team builds a system

The construction of the teaching team breaks through the traditional disciplinary barriers, integrates high-quality resources both inside and outside the school, and forms a guidance system featuring "multiple subjects and cross-border collaboration". The team is composed of teachers from the Department of Electrical Engineering and the Department of Mechanical Engineering of North China Electric Power University as its backbone, and has recruited 12 experts including the chief technician of China National Nuclear Research Institute, technical experts of State Grid, and engineers from power robot enterprises. It covers professional fields such as high-voltage technology, mechanical design, automatic control, relay protection, and innovation and entrepreneurship management. On-campus teachers and enterprise mentors complement each other and jointly undertake the teaching of courses such as "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology", "Aircraft Control Technology", and "Innovative Design of Robots". This dual-teacher structure of "university teachers + industry craftsmen" not only ensures the imparting of cutting-edge theories but also strengthens the orientation towards engineering practice, making the course content closely align with the real scene demands of the power industry, such as unmanned aerial vehicle inspection and robot operations.

2.2.2 Dynamic integration of stratified cultivation of student teams builds paths

The construction of student teams adopts the model of "hierarchical cultivation and dynamic integration". The basic layer is open to all undergraduate students of the university. Through 7× 24-hour open platforms such as the Aircraft Club and the Robot Club, it attracts students from different majors to participate in technical training and popular science activities, covering an average of over 2,000 people on average each year. The advanced level takes "project-based learning" as the core, forms interdisciplinary research teams, and under the guidance of teachers, completes the technological development and competition transformation. The elite layer achieves in-depth cross-disciplinary integration through the "Electric Power Robot Experimental Class". Every year, students are selected to systematically study courses such as unmanned aerial vehicle control and mechanical innovation design outside their main major, forming a compound ability of "major + X". This three-level system of "club - project team - experimental class" effectively supports students' full-process development from interest enlightenment to innovative practice.

2.2.3 Operating mechanism: dual-helix drive with strong synergy

The team operation mechanism highlights the "double helix drive". In teaching, we have implemented the "integration of competition and course" model, transforming competition topics into course projects and developing multiple practical courses. In the past three years, we have guided students to win 26 national awards (including the "Internet +" Gold Award). In scientific research, a "problem-oriented" collaborative innovation approach is implemented. Teachers bring enterprise topics into the classroom, and student teams complete technological breakthroughs under the guidance of their mentors. In the past three years, 62 patents have been authorized, and the achievements have been promoted and applied in Hebei Power Grid and State Grid. This mechanism of "promoting innovation through competitions and learning through research" enables teachers and students to grow together in solving cross-disciplinary problems, truly achieving mutual growth through teaching and learning.

2.2.4 The collaborative construction of educational outcomes reveals value

Through the collaborative construction of multi-disciplinary teams, the effectiveness of education has been significantly enhanced. In the past three years, under the guidance of teachers, student teams have won 1,000 awards in provincial and ministerial-level or above science and technology competitions and incubated entrepreneurial projects such as "Yidian Technology". The course "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology" developed by the team has become a provincial-level demonstration class for the maker training camp. Its three-stage teaching method of "theoretical teaching - simulation training - practical flight" has been adopted by many universities. More importantly, this training model that breaks down disciplinary boundaries and promotes collaboration between schools and enterprises enables students to possess the comprehensive ability to solve complex engineering problems in the energy and power sector, providing a replicable practical paradigm for the cultivation of new engineering talents in the new era.

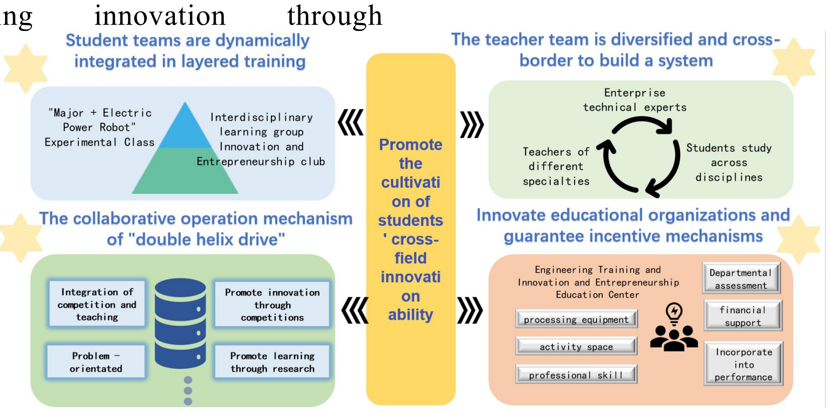

Figure 2. Interdisciplinary Cooperation and Innovation Ability Cultivation System

As shown in Figure 2, it is the diagram of the system for cultivating interdisciplinary cooperation and innovation capabilities. This system, through the collaborative construction of student organizations, mentor teams and practical platforms, has formed an educational closed loop of "interest-driven - technology-empowered - practical implementation", promoting the cultivation of multi-disciplinary cross-innovation capabilities.

2.3 Digital Resource Integration and Engineering Practice Closed Loop

In response to the core objective of "cultivating students' technical literacy, scientific literacy and innovative literacy" in the teaching experiment syllabus of "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology", the construction of its multi-disciplinary cross-practical education system is guided by the integration of theory and practice and the collaborative empowerment of multiple disciplines. Relying on the experimental content set in the course and the training needs of undergraduate students in science and engineering, Form a complete framework covering knowledge transfer, skills training and innovation cultivation. This system integrates cutting-edge teaching resources and builds professional practice platforms, transforming the ability goals required by the syllabus, such as understanding the structure of unmanned aerial vehicles, assembly and debugging, programming and operation, into practical educational practices that can be implemented. It supports students' full-process development from interest enlightenment to innovative practice.

2.3.1 Frontier integration and digital support

The construction of teaching materials and digital teaching resources strictly adheres to the teaching requirements of the syllabus for "Basic knowledge, practical Applications and Cutting-edge Technologies of Unmanned Aerial Vehicles", taking the latest network knowledge summary and organization as the core source, and systematically integrating industry trends and theoretical achievements. The content not only covers the fundamental principles of "Micro Aircraft System Technology" and the core methods of "Design and Control of Multi-rotor Aircraft" in the reference textbooks designated in the syllabus, but also incorporates cutting-edge content such as secondary development of unmanned aerial vehicles and extended applications of artificial intelligence. It also updates the latest operation software and usage norms in the industry simultaneously. At the same time, in line with the demands of digital teaching, virtual simulation experiment resources and online learning platforms are developed to support students in independently completing tasks such as familiarizing themselves with the programming environment and conducting simulated flight training, providing unified and syllabus requirement-oriented channels for knowledge acquisition and skill previewing for students of different majors.

2.3.2 Laboratory platform and full-process training

The practical teaching resources, with the innovation laboratory and unmanned aerial vehicle laboratory of the Engineering Training Center as the core carriers, closely align with the experimental arrangements in the syllabus to construct a hierarchical training system. At the basic level, through the "Current Situation and Basic Knowledge of the Unmanned Aerial Vehicle Industry" module, structural cognition and software operation training are completed relying on laboratory equipment, covering the basic requirements of the outline "Understanding the Structure of Each Part of the Aircraft". The advanced level conducts interactive development and flight simulation practices in the laboratory by leveraging the "programming-related operations, simulator flight" module, and implements skill goals such as "setting up the development environment and using the ground station". The elite layer focuses on the "Secondary Development Technology and Program Control" module, using professional laboratory equipment to complete the full-process debugging and development of unmanned aerial vehicles (UAVs), meeting the advanced requirements of the outline "Practical Operation Flight and Development of UAVs". Students from multiple disciplines collaborate in the laboratory to participate in assembly, programming, testing and other processes, integrating interdisciplinary knowledge such as mechanical design, electronic circuits and automatic control into practice, effectively enhancing the innovative awareness and practical ability emphasized in the syllabus.

3. Research and Practice Situation

3.1 Teaching Reform Practice

To deepen the cultivation of compound talents, our school has systematically implemented an interdisciplinary collaborative teaching reform. The core measures include building a multi-dimensional teaching team, reconstructing a progressive curriculum system, establishing a platform for integrating competitions and courses, and innovating teaching methods, which have significantly enhanced students' engineering practice and innovation capabilities.

3.1.1 Reconstruction of the curriculum system led by interdisciplinary teaching teams

This reform is based on the provincial

teaching team "Yidian Technology", deeply integrating the advantages of teaching staff in disciplines such as power engineering, mechanical design, automatic control, and innovation and entrepreneurship management, and has established a "three-dimensional integrated" collaborative teaching team composed of 12 on-campus teachers, enterprise experts, and scientific research backbones. The team members include senior professionals from fields such as high-voltage technology, mechanical design, and nuclear power operation and maintenance. The team, through a regular teaching and research mechanism, collaboratively breaks down disciplinary barriers: teachers from the power discipline lead the in-depth analysis of drones in professional scenarios such as power inspection, the mechanical team is responsible for providing precise guidance on the structure and debugging technology of aircraft, and enterprise mentors continuously inject cutting-edge industry cases and practical experience. Supported by this powerful team, we have restructured a three-stage progressive curriculum system of "Foundation - integration - innovation" with "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology" as the core carrier.

The basic theoretical layer organically integrates the core knowledge of "Design and Control of Multi-Rotor Aircraft" and "High Voltage Insulation", laying the cognitive framework for the principles of unmanned aerial vehicles and their electrical applications. The simulation practice layer relies on ground station simulation software and conducts immersive virtual training in combination with typical tasks such as transmission line path planning. The innovation and development layer introduces the STM32 embedded development platform to guide students in the secondary development of programs such as drone obstacle avoidance and precise aerial photography, thereby stimulating their innovative potential. This system has effectively covered over 2,000 students from 32 majors, significantly enhancing the breadth and depth of compound ability cultivation.

3.1.2 Collaborative innovation of the competition-course integration practice platform and teaching methods

We have made efforts to build a "competition and course integration" practice platform with hardware support, project-driven and technology transfer as the closed loop. At the hardware level, an innovation laboratory equipped with industrial-grade drones, 3D modeling systems and virtual reality devices has been established, providing a solid guarantee for practical teaching. At the project level, the topics of high-level competitions such as the "China Engineering Robot Competition" and the "Internet Plus Competition", like "Transmission Line Ground Wire Repair Robot", are creatively transformed into course experiment modules, achieving the projectization of competition topics and the cartelization of projects. In terms of achievements, over the past three years, I have guided students to win 26 national awards. Among them, the project "Yidian Technology - Pioneering the Unmanned Era of High-voltage Live Working" won the gold award in the 2022 "Internet Plus" National Competition. The related innovative achievements have been promoted in technology in enterprises such as State Grid.

Relying on this platform, an innovative teaching method (CDIO-PBL) that deeply integrates "conception - design - implementation - operation" with "problem-driven learning" has been implemented. The teaching organization emphasizes cross-disciplinary (such as electrical + computer + mechanical) group collaboration to jointly tackle comprehensive topics that stem from the real demands of enterprises, such as the "Intelligent Inspection Drone for Distribution Equipment" (like the "Generator Air Gap Detection" of China National Nuclear Corporation). The teaching process adopts an iterative development model. Through a closed-loop cycle of "simulation testing → on-site feedback → solution optimization", it continuously refines students' ability to solve complex engineering problems. This method has achieved remarkable results. The proportion of course projects transformed into awards in high-level competitions is as high as 82%, fully verifying its effectiveness in cultivating students' engineering practice and innovation capabilities.

3.2 Achievements in Cultivating Innovative Talents

3.2.1 Students' innovation capabilities and competition achievements have achieved a leapfrog improvement

In the past three years, I have guided students to win 26 awards in provincial and ministerial-level or above science and technology competitions, covering authoritative events such as "Internet Plus" and "Engineering Robot Competition". In 2022, the "Yidian Technology" project won the gold medal in the national "Internet Plus" competition, achieving a breakthrough for the school in this event. The participants covered multiple majors, and the achievements closely addressed the pain points of the power industry. In 2023, the "Intelligent Delivery Unmanned Aerial Vehicle" project once again won the special prize in the provincial competition, highlighting the effectiveness of cross-disciplinary practices.

3.2.2 The radiation and demonstration effect of the education model is remarkable

The "discovery - optimization - iteration" cultivation path constructed has been promoted by the provincial Department of Education. Relying on the 7× 24-hour open laboratory to support the entire chain of practice, a multi-disciplinary team composed of 7 people from the school and 8 people from the enterprise was awarded the title of provincial outstanding teaching team. The course model was replicated to five platforms, helping the school achieve its best historical results of 2 gold MEDALS, 2 silver MEDALS and 4 bronze MEDALS in the 8th "Internet Plus" Competition.

4. Research, Promotion and Application Situation

4.1 On-Campus Innovation and Entrepreneurship Education Radiates throughout the Region

Through the three-level practical system of "course - club - experimental class", the full coverage of innovation and entrepreneurship education for students of all majors in the school has been achieved. The Core carrier Drone Club organizes over 50 events annually, with more than 150 registered members, forming a stable cross-professional community. The model has attracted over 2,000 people to participate in innovation and entrepreneurship activities each year. The total number of registered students in related clubs exceeds 2,000. Students have won a total of 1,000 awards in national and provincial competitions (including multiple gold MEDALS in top-level events for the drone project). It simultaneously supports 20 high-level innovation projects, cultivates 30 to 40 "professional + unmanned aerial vehicle/robot" compound talents annually, and becomes the core engine of the school's innovation and entrepreneurship education.

4.2 Benchmarking of Innovative Practical Teaching Models

The "integration of competition and course, and multi-disciplinary intersection" model constructed has become a benchmark for the reform of innovation and entrepreneurship education in colleges and universities. It breaks down the barriers between departments and colleges, forms a team of multi-disciplinary teachers and enterprise experts, and creates a closed-loop teaching chain of "theory - simulation - practical operation - competition". Its innovation lies in using drone courses as a link to transform scientific research projects and enterprise demands (such as power inspection and intelligent distribution) into teaching content, and deeply connect with the industry. This paradigm has been certified by provincial and ministerial-level educational reform projects and has helped the school win the gold medal for the first time in the national "Internet Plus" competition (the "Yidian Technology" project), verifying its value and providing a replicable model for similar universities.

4.3 Social-Industry-International

Collaborative Radiation Network

This model has established a collaborative mechanism of "universities - enterprises - international events", forming a diversified radiation network. In terms of industry, we have deeply cooperated with units such as State Grid, applied the course development technologies (such as transmission line inspection and insulation detection) to practical scenarios, won provincial and ministerial-level science and technology progress awards, and promoted them on a large scale in the power grid, driving the unmanned innovation of the industry. Internationally, the teams cultivated have achieved remarkable results in international robot competitions, demonstrating their international recognition. The "Yidian Technology Team" jointly established by schools and enterprises realizes the cycle of "enterprise demand - course development - technology transformation", which not only provides compound talents but also offers a model for universities to serve the local economy and industrial upgrading.

5. Characteristics of Research Achievements

5.1 The Multi-Disciplinary Integrated Construction of the Curriculum System

This model takes the drone practice course as the core and builds a curriculum system that integrates interdisciplinary knowledge. The course content covers the structure and principles of unmanned aerial vehicles (UAVs), control technology, programming development (such as input-output correlation programming), secondary development interfaces, etc. It integrates knowledge from multiple disciplines including electrical engineering, mechanics, computer science, and automation. It not only includes the theoretical basis of textbooks such as "Micro Aircraft System Technology", but also incorporates industry application cases such as UAV inspection in the power industry. As a public elective course designated by the school, this course is open to all majors across the university, breaking down disciplinary barriers and enabling students from different majors to complement each other in knowledge through drone practice. It forms a three-dimensional course framework of "basic theory + interdisciplinary skills + industry application", providing content support for multi-disciplinary cross-education.

5.2 Collaborative and Practical Innovation of Teaching Models

In the implementation of teaching, a collaborative model of "theoretical teaching - simulation training - practical operation development - competition incubation" has been formed. Through the allocation of class hours including theoretical explanations, experiments (such as the programming correlation between buttons and motors), and on-machine (simulator flight and familiarity with the development environment), a deep connection between theory and practice is achieved. Innovatively adopting a cross-disciplinary project-based learning approach, students form teams in the form of CDIO groups and, in combination with tasks such as secondary development of unmanned aerial vehicles, complete the full-process practice from program design to actual operation. At the same time, the integration of competition and teaching is carried out throughout the process. The course content is connected with events such as the China Engineering Robot Competition and "Internet Plus", making the teaching process a process of preparing for competitions and incubating innovative achievements, and promoting multi-disciplinary students to collaboratively solve complex problems in practice.

5.3 Industry Radiation Effect of Technology Transfer

Relying on what they have learned in their courses, students have achieved remarkable results in various competitions, such as the second prize in the China Engineering Robot Competition and the Gold Award of Hebei Province's "Internet Plus". Some projects (such as the power inspection drone technology) have been applied in actual industrial scenarios and have been recognized with the State Grid Science and Technology Progress Award, etc. This has promoted the deep integration of drone technology with industries such as energy and logistics. Form replicable multi-disciplinary cross-education models.

6. Summary

This research focuses on the interdisciplinary practical education in colleges and universities. Taking the "Fundamentals of Unmanned Aerial Vehicle Practical Application Technology" course as the carrier, it constructs a four-dimensional curriculum system of "theoretical foundation - simulation training - practical operation innovation - industry-education integration". Form an interdisciplinary teaching team and a fully open platform to create a closed loop of "courses - competitions - industries". In practice, students have won 26 national awards, incubated industrialization projects, and promoted their technologies in the power industry, becoming a benchmark for innovation and entrepreneurship education and providing an example for the cultivation of compound talents in colleges and universities.

The next step will be to deepen the breadth and depth of interdisciplinary integration, optimize the dynamic resource ecosystem, and strengthen the connection with industrial demands. We will continue to improve the mechanism of integrating competitions and courses and promoting learning through research, expand the coverage of the model, and facilitate the transformation of more teaching achievements into industrial value, so as to help universities better serve the demands of the innovation-driven development strategy and the upgrading of industries such as low-altitude economy.

References

[1] Li Xinxiong, Fu Weiye. Guangxi's Low-altitude economy is on the rise. Guangxi Daily, 2025-01-07(010).
[2] Zhu Feng, Yang Zhao, Lu Jing. Exploration and Practice of Educational and Teaching Reform in Unmanned Aerial Vehicle System Engineering. Knowledge Library, 2024, 40(23): 135-138.
[3] Yue Rui, Zhang Liangxi, Yu Dandan. Research on the Empowerment of Mobile Communication Professional Talent Cultivation in Vocational Colleges by Unmanned Aerial Vehicle Technology. Knowledge Library, 2025, 41(09): 151-154.
[4] Qiu Qingbin. Research on the Practical Teaching Mode of Unmanned Aerial Vehicle Technology Application in Secondary Vocational Schools Guided by Interest. The use and maintenance of agricultural machinery, 2025, (5): 170-172.
[5] Zhao Yanlei, Li Xiaoyu, Yang Fan, et al. Exploration on the Reform and Construction of the "Unmanned Aerial Vehicle Communication and Navigation" Course Based on Blended Teaching Southern Agricultural Machinery, 2020, 56(13): 178-181.
[6] Zhao Li. Innovation in Curriculum Design and Teaching Methods of Unmanned Aerial Vehicle Technology in Higher Vocational Education. Academic Weekly, 2024, (16): 95-98.
[7] Xiang Cong, Wang Zeyu. How is the Integrated Development of Education, Science and Technology, and Talent Possible? The Experience and Implications of the EU's Deep Science and Technology Talent Program Higher Engineering Education Research, 2025, (04): 177-183.
[8] Zhang Xiangyu, Wang Xinyi, Zhao Wei. Discussion on Unmanned Aerial Vehicle Technology Education Based on the Background of Innovation and Entrepreneurship in Colleges and Universities. Education and Teaching Forum, 2020, (12): 370-371.
[9] Qu Yawei, Chen Weina, Tang Yujuan, et al. Exploration of Ideological and Political Education in the "Unmanned Aerial Vehicle Technology and Application" Course under the Background of New Engineering. Education and Teaching Forum, 2024, (48): 119-122.
[10]Wang Ancheng, Li Jiansheng, Guo Yuyan, He Zhiqiang. Exploration and Practice of Practical Teaching Mode for Unmanned Aerial Vehicle Technology and Application Course. Bulletin of Surveying and Mapping, 2022, (S1): 119-122.
[11]Zhu Ke, Wang Wei, Yang Lubin. Teaching and Learning of "5G+ Unmanned Aerial Vehicle" Technology: Scenarios, Paths and Future Application Prospects. Journal of Distance Education, 2019, 37(04):33-41.