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Curriculum System Construction for Typical Positions in Drone Application Technology Major

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Abstract: In response to the needs of drone equipment construction in the new situation, a professional committee was established to conduct in-depth research in the military and industry, combined with the characteristics of higher vocational students and military job demands, to reconstruct the curriculum system of Drone Application Technology major. This aims to enable students to better grasp the necessary knowledge related to the profession, broaden students' knowledge base, consolidate and enhance their professional knowledge and skills, and provide reference for the construction of related professional curriculum systems in higher vocational colleges.

Keywords: Unmanned Aerial Vehicle (UAV) Application Technology Major; Job Skills; Curriculum System

1. Introduction

To meet the requirements of modern military forces in the new era, the development of highly skilled professionals in the field of drones has become a key aspect of military equipment. Cultivating these professionals has become an urgent issue for armed forces around the world. In future wars, professionals specializing in drone application technology will play an indispensable and crucial role in tasks such as drone operation, maintenance, management, and more. Therefore, the goals of cultivating professionals in the drone field need to be comprehensive. They should not only possess solid operational skills and a scientific and cultural foundation but also understand the principles of flight control system construction, operational methods, and maintenance of drone equipment. Additionally, they should have organizational training and management abilities as well.[1]

2. Course Reform Based on Core Job Competencies

Course reform based on core job competencies refers to a curriculum restructuring guided by the knowledge and professional abilities required for specific positions. This approach emphasizes the progressive development of competencies, integrating job competency requirements into teaching activities, and focusing on competency-oriented teaching assessments.

The model for course reform based on core job competencies comprises five stages:

1) Talent Demand Analysis Stage: Conduct research on the positions, professional talents needed, and talent specifications required for the application of drone technology. This analysis involves exploring industry, enterprise, and graduate perspectives.

2) Occupational Competency Analysis Stage: Form a professional committee consisting of experts from schools, enterprises, and third-party organizations. Organize meetings and discussions to determine the core job competency requirements for typical positions in the drone profession.

3) Curriculum System Construction Stage: Integrate typical job positions and core job competencies into the construction of the curriculum system. Restructure course content, focusing on the progressive development of competencies.

4) Curriculum Teaching Implementation Stage: Establish a student-centered approach, setting core job competencies as the goal. Develop teaching plans, define unit hours, and plan implementation pathways.

5) Curriculum Teaching Assessment Stage: Standardize assessment content, diversify assessment methods, and incorporate diverse themes. Emphasize the evaluation of core job competencies and the cultivation of standardized practices.

3. Core Job Competencies in Drone Application Technology Profession"Occupational Warehouse" Theory

3.1 "Occupational Warehouse" Theory

Every industry encompasses a multitude of occupations. Overall, these occupations exhibit characteristics of "horizontal classification

and vertical grading." The criteria for horizontal classification are not uniform; they may be based on job nature, managerial functions, or professional and technical categories. The chosen classification method primarily focuses on facilitating the development and management of human resources within the occupational system. Vertical grading generally refers to the hierarchical division of technical, skill-based, or managerial levels. Delving into the functions, scope, and features of occupational activities in the occupational map through in-depth research, and comparing the relationships, similarities, inclusiveness, similarities, and repetitions among various occupations, representative typical occupations are identified, categorized horizontally and graded vertically to form an "occupational warehouse." Each occupational warehouse represents a "profession" in vocational education. Occupational warehouses serve as bridges between professions and education, linking the learning paths of vocational education learners with employment goals and career development, connecting learning with work.[2]

To ensure that the professional courses closely match the job skills required by the industry, we start from the typical career development paths in enterprises and determine various skill categories through occupational competence analysis. This includes types of positions, occupational knowledge, occupational skills, occupational qualities, and other aspects. Compared to traditional methods, using occupational analysis provides distinct advantages, offering students clear learning objectives and specific learning tasks, thereby cultivating professional abilities that are more aligned with industry demands.[3]

3.2 Typical Positions and Core Competencies in Drone Application Technology Profession

The teaching team conducted in-depth research and industry analysis in the military to understand the employment trends and industry demand for talents in the field of drone application technology. They engaged in discussions and interviews with industry experts, military representatives, and relevant organizations. Additionally, they collected job recruitment information and market data to gain insights into typical positions in different fields. After analyzing the research data, typical job positions in the drone application technology profession were identified, namely, Drone Mission Operator, Drone Flight Controller, and Drone Maintenance Technician. A specialized committee was formed in collaboration with industry and company experts to analyze and discuss the research data and determine the core competencies required for these typical job positions in the drone application technology profession.

Table 1 Drone Professional Competency Chart

Post	Professional Knowledge	Vocational Skills
Drone flight controller	Mastering knowledge of drone control	Capable of controlling drone flight
	Master software control ability	Capable of simulating drone driving
	Master drone safety knowledge	Avoid touching relevant laws and regulations
Drone Task Force	Mastering video processing techniques	Capable of controlling drone shooting capabilities
	Mastering knowledge of drone mission payloads	Capable of analyzing and designing task payloads
	Master drone power drive technology	Proficient in installing, starting, and testing different types of engines
Drone maintenance personnel	Master knowledge of drone assembly and debugging	Capable of assembling and debugging drones
	Master the system structure and performance indicators	Understand the structure and system functions of drones
	Master knowledge related to hydraulic and pneumatic systems	Ability to analyze commonly used circuits and systems

Following the concept of sharing common skills among typical positions, six courses including engineering drawing, drone virtual flight technology, and drone flight principles with meteorological environment were selected as foundational courses in the "bottom-level common" module. Around the typical job positions, modules for Drone Flight Controller, Drone Mission Operator, and Drone Maintenance Technician were established in a modular way to train core skills required for these positions in the "intermediate level separation" module. To nurture versatile and composite drone talent, optional courses such as drone mapping technology, drone flight safety, and legal regulations were provided in the career development module, allowing students to broaden their skill set in the "top-level mutual selection" module.

4. Conclusion

The application of drone technology closely follows the requirements of the military's professional team building and focuses on combat-oriented objectives. It aligns with the knowledge and skills needed for drone-related positions, integrates all elements of drone professional talent development, and combines the characteristics of joint military-civilian training. It actively explores high-quality and efficient training models to promote close collaboration between universities and the military, as well as the alignment with practical combat and job-oriented education, aiming to cultivate dual-use talents that meet the requirements of both military and civilian positions.

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