

Research on the Reform of Physical Training Courses for General Aviation Control Majors

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Abstract

Against the backdrop of the rapid development of China's aviation industry, the occupational pressure on civil aviation practitioners has significantly increased, which puts higher demands on their physical and mental qualities. Through in-depth investigation of employed students, we found that there is a widespread phenomenon of declining physical fitness and difficulty in effectively performing job tasks. It is worth noting that the current education curriculum system still lacks targeted physical training content, which cannot fully meet the high standard requirements of the industry for the physical and mental qualities of practitioners. In view of this, this study comprehensively examines and explores the reform of existing physical training courses from the perspective of teaching and research, closely combining with the actual situation of civil aviation control work. The aim is to improve students' physical fitness, including key physical indicators such as strength, endurance, and flexibility, through scientifically reasonable curriculum design. It also focuses on cultivating their perseverance, efficient teamwork ability, and good psychological adjustment ability, in order to achieve comprehensive improvement of students' physical and mental fitness, and to provide more composite talents with excellent physical and mental fitness for the civil aviation industry, ensuring the continuous improvement of aviation safety and service quality.

Keywords

Vocational education, Ideological and political courses, Physical education, Curriculum reform.

1. Introduction

The concept of combining regulatory specialization with physical training aims to organically integrate the rigor and standardization of regulatory specialization with the educational function of physical training through interdisciplinary approaches, and promote the comprehensive development of students. By integrating the rigor and standardization of regulatory majors with the educational function of physical training through interdisciplinary approaches, it helps to cultivate students' comprehensive qualities and social adaptability. The introduction section elaborates on this concept in detail.

1.1. Combining background and meaning

With the increasing demand for versatile talents in society and the emphasis on cultivating students' comprehensive qualities in higher education^[1], it is particularly necessary to conduct research on the reform of physical training courses for general aviation control majors. The regulatory major focuses on cultivating students' professional skills and professional ethics,

while physical training emphasizes the combination of sports activities and ideological and political education to enhance students' ideological and moral level and physical and mental health. The combination of the two can not only enrich the teaching content of regulatory majors, but also effectively enhance students' comprehensive quality and social adaptability.

1.2. Combining ideas

1.2.1. Integration of Teaching Standards

Emphasis should be placed on both professional skills and sportsmanship: In the teaching process of Control Specialty [2], not only should emphasis be placed on imparting professional knowledge and cultivating professional skills, but also on incorporating physical training elements to cultivate students' sportsmanship, teamwork spirit, and sense of social responsibility.

Stage 1 implementation: Develop differentiated teaching objectives for students of different grades and stages. For example, lower grades emphasize the cultivation of basic sports skills and ideological and political knowledge, while higher grades emphasize the cultivation of application and innovative abilities in regulatory practice.

1.2.2. Teaching Integration of Content

Professional Course 1: Penetrating Physical Training: Incorporate physical training elements appropriately into the core courses of Control Major. For example, in aviation control courses, the history and current situation of aviation sports can be introduced, as well as the application of aviation sports spirit in control work; In traffic control courses, the relationship between traffic congestion and the physical and mental health of citizens can be explored, guiding students to pay attention to the sustainable development of urban transportation.

Incorporating regulatory professional characteristics into Sports Activity: Incorporating regulatory professional elements into Sports Activity and sports events. For example, organizing characteristic sports activities such as simulated air traffic control competitions and traffic command gesture exercises, allowing students to experience the rigor and challenges of control work in practice.

1.2.3. Teaching Method Innovation

Case Study 1: Select typical cases in the regulatory field and analyze and discuss them in combination with physical training elements. Through case analysis, guide students to deeply consider ethical issues and the importance of teamwork in regulatory work.

Situational teaching 1: Use simulation laboratory and virtual reality technology to create realistic control work scenarios. Through situational teaching, students can experience the power of sportsmanship, such as perseverance and courage to strive, in simulated regulatory work.

1.2.4. Evaluation System Reform

Multi dimensional evaluation system: Establish an evaluation system that includes multiple dimensions such as professional skills, physical fitness, and teamwork. In the evaluation process, it is not only important to focus on students' professional skills, but also to pay attention to their sportsmanship and moral performance.

Combining process oriented evaluation with outcome oriented evaluation: evaluates the learning process of students, focusing on their performance and progress in participating in sports activities and regulatory practices. At the same time, it is also necessary to comprehensively evaluate students' comprehensive qualities and development potential in conjunction with outcome based evaluation.

1.2.5. Implementation guarantee

Strengthen Teacher Training: Organize interdisciplinary training for regulatory and educational teachers to enhance their understanding and ability to integrate regulatory courses with physical training courses.

Improve teaching facilities: Increase investment in teaching facilities and physical training venues to provide strong material support for the integration of regulatory professional courses and physical training courses.

Establish a unified mechanism: Strengthen cooperation and communication between schools and regulatory agencies, as well as sports departments, to jointly promote the integration of regulatory professional courses and physical training courses.

In short, the concept of combining 1-level professional courses with physical training courses is an innovative and practical educational philosophy.

2. Responsibilities and Requirements of Manager

2.1. Responsibilities of air traffic controllers in air traffic management

Ensure the safety of aircraft flight: The primary responsibility of air traffic controller ^[2] is to ensure the safe flight of aircraft on designated routes and flight altitudes. They need to develop a reasonable flight plan based on factors such as aircraft performance, meteorological conditions, and route conditions, and monitor the aircraft's flight status in real time. In emergency situations, air traffic controllers need to quickly take measures to command aircraft to make emergency evasive maneuvers or landings, in order to maximize the safety of passengers and crew members.

Compliance with Air Traffic Management Regulations: Air traffic controllers must strictly comply with relevant air traffic management regulations, including the Civil Aviation Law of the People's Republic of China. These regulations specify the specific responsibilities, operating procedures, and safety standards that must be followed for air traffic control, and are the basic guidelines for the work of air traffic controllers.

Maintaining Air Traffic Order: Air traffic controllers need to maintain order in air traffic, ensuring safe intervals and flight sequences between aircraft. They need to accurately grasp the position, speed, and heading information of each aircraft, and avoid conflicts and collisions between aircraft through reasonable scheduling and command.

It should be noted that although air traffic controllers play a crucial role in ensuring flight safety, the causes of air disasters are often complex and diverse, and responsibility cannot be simply attributed to controllers. In the process of air crash investigation, multiple factors such as flight operations, aircraft performance, meteorological conditions, and ground support facilities will be comprehensively considered.

2.2. Requirements for Air Traffic Controllers

Professional knowledge and skills: Air traffic controllers need to have solid knowledge of aviation, meteorology, navigation systems, and radio communication, as well as proficient skills in radar operation and air traffic control systems.

High sense of responsibility and professionalism: The work of an air traffic controller is directly related to flight safety, so it is necessary to have a high sense of responsibility and professionalism, and always maintain alertness and focus.



Figure 1. Pre-job training for controllers

Good psychological resilience and adaptability: When facing emergency situations, air traffic controllers need to remain calm, rational, make correct decisions quickly, and effectively respond to various unexpected situations.

Communication and Coordination Skills: Air traffic controllers need to effectively communicate and coordinate with pilots, other controllers, and ground support facility personnel to ensure safe and smooth flight.

In summary, the responsibility of air traffic controllers in air disasters is significant, and the job requirements are also very strict. They jointly maintain the safety and smoothness of air traffic through their professional knowledge and skills, high sense of responsibility and dedication, good psychological resilience and adaptability, as well as communication and coordination abilities. Through case analysis, students can gain a deeper understanding of the responsibilities and obligations of air traffic controllers, while also adhering to the bottom line of safety. At the same time, through case studies, students can also experience the importance of physical exercise in the work process, and good physical fitness is of crucial significance to aviation safety, which is reflected in multiple aspects, including the physical fitness requirements of air traffic controllers and other aviation staff.

3. Fundamental Diseases Brought By Regulatory Expertise

The fundamental diseases and hazards brought by the regulatory profession mainly include the following aspects:

3.1. Basic diseases

Eye diseases: Staring at radar screens and computer monitors for a long time can easily lead to vision loss, eye fatigue, dry eye syndrome, and other eye diseases.

Sleep disorders: Due to high work pressure and irregular sleep patterns, air traffic controllers may experience sleep disorders such as difficulty falling asleep, easy awakening, and frequent dreaming.

Cervical spondylosis: Air traffic controllers who face radar screens and computers for long periods of time, maintain a certain posture of the head for too long, causing the cervical spine to be in a flexed position or certain specific positions for a long time, which can easily lead to cervical osteoarthritis, proliferative cervical spondylosis, cervical nerve root syndrome, cervical disc herniation and other cervical spondylosis. These diseases can affect the work efficiency of controllers, reduce subjective capacity (processing ability), and may even lead to inability to work.

Mental stress-related diseases: Controllers experience high work pressure and are in a state of tension for a long time, which can easily lead to mental stress-related diseases such as neurasthenia, anxiety, and depression. These diseases not only affect the physical and mental health of air traffic controllers, but may also pose a potential threat to flight safety.

Cardiovascular disease: Due to the nature of their work, controllers may face irregular sleep schedules and high-intensity mental stress, which can increase the risk of cardiovascular diseases such as hypertension and heart disease.

Digestive system diseases: Long term mental stress and irregular sleep patterns may also lead to digestive system diseases in controllers, such as gastric ulcers, gastrointestinal dysfunction, etc.

3.2. Harm

Safety hazards: When the controller's body becomes fatigued, it is easy to cause unsafe behavior, such as judgment errors, decision-making errors, etc., which pose a potential threat to flight safety.

Efficiency hazards: Controllers may experience increased anxiety, decreased short-term memory, and delayed response when in a state of fatigue, leading to a decrease in work efficiency.

Health hazards: Long term engagement in regulatory work may lead to various chronic diseases, causing long-term impacts on the physical and mental health of controllers.

3.3. In summary

the fundamental diseases and hazards brought by regulatory professions cannot be ignored, and effective measures need to be taken for prevention and intervention. There are many risks associated with prolonged sitting every day, and the harm caused by prolonged sitting and lack of exercise to the body is multifaceted. These harms can gradually accumulate and may have far-reaching effects on health. The main hazards of prolonged sitting include:

1)Increased risk of cardiovascular disease: Prolonged sitting and lack of exercise can slow down blood circulation, increase the burden on the heart, and thus increase the risk of cardiovascular diseases such as heart disease, hypertension, and stroke.

2)Obesity and metabolic syndrome: Lack of exercise can reduce the amount of energy consumed by the body, while prolonged sitting can easily lead to an imbalance between energy intake and expenditure, thereby causing obesity. Obesity is an important risk factor for metabolic syndrome, including hyperglycemia, hyperlipidemia, hypertension, etc.

3)Muscle and bone problems: Long term inactivity can lead to muscle atrophy, decreased strength, and decreased bone density, increasing the risk of osteoporosis and fractures. In addition, prolonged sitting may also lead to spinal problems such as cervical spondylosis and lumbar disc herniation.

4)Digestive system issues: Lack of exercise can affect intestinal peristalsis, leading to digestive problems such as constipation and indigestion. Prolonged sitting may also increase intra-abdominal pressure, affecting the normal function of the gastrointestinal tract.

5)Psychological health issues: Prolonged lack of exercise may lead to mental health problems such as low mood, anxiety, and depression. Exercise can help release stress and improve mood, while lack of exercise may exacerbate these negative emotions.

6)Respiratory system issues: Prolonged sitting may lead to shallow breathing, inadequate exercise of the lungs, and a decrease in lung capacity and respiratory system function. In the long run, it may increase the risk of respiratory diseases.

7) Increase the risk of chronic diseases: In addition to the above-mentioned diseases, sedentary and prolonged inactivity may also increase the risk of chronic diseases such as diabetes and certain cancers (such as colon cancer).

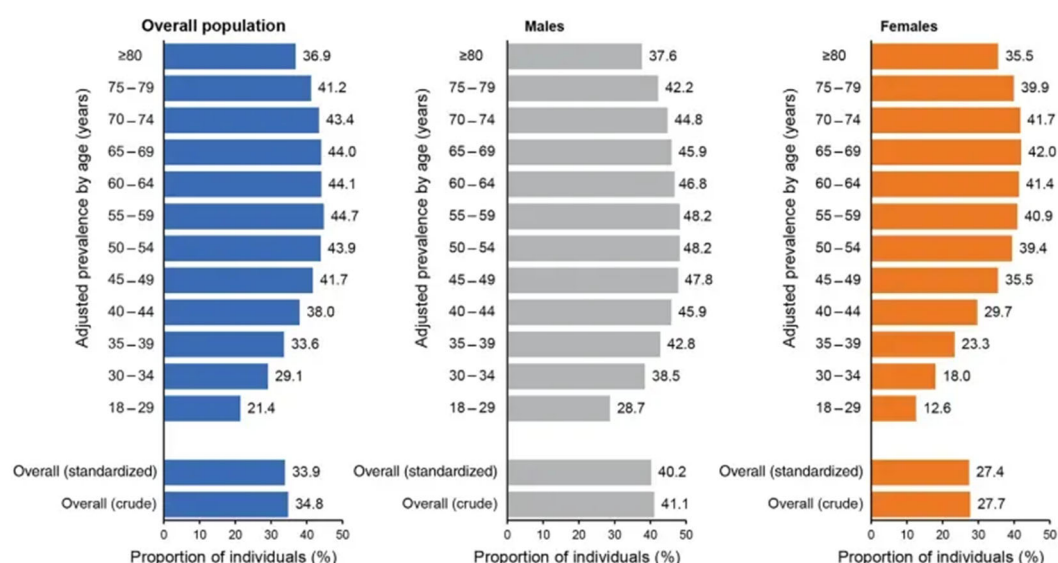


Figure 2. The current trend of overall obesity rates in China and many parts of the world

4. The Concept and Measures of Combining Regulatory Work With Physical Education Curriculum

Based on the particularity of the work of air traffic controllers, how to organically combine physical education courses with core courses such as professional courses has become an urgent

issue. This is an innovative and practical educational philosophy aimed at comprehensively enhancing the physical fitness, psychological resilience, and professional skills of aviation control students to adapt to the complexity and high-intensity requirements of future aviation control work. Here are some specific ways of combining:

4.1. Course design philosophy

Balancing Body and Mind: Physical education courses not only focus on students' physical training, but also emphasize the cultivation of psychological qualities, promoting students' comprehensive development together with core courses in aviation control.

Professional Integration: Based on the characteristics of the aviation control profession, design targeted physical education course content to closely link sports training with professional needs.

Integration of Theory and Practice: Physical education courses should integrate theoretical knowledge of aviation control majors, and deepen students' understanding and application abilities through practice.

4.2. Specific combination method

4.2.1. Course Content Design

Basic physical fitness training: including endurance, strength, speed, agility and other basic physical fitness training, laying a solid physical foundation for long-term, high-intensity air traffic control work.

Aviation specific physical training: Simulate special positions and prolonged concentration scenarios in aviation control work, design specialized physical training programs such as vestibular function training, balance ability training, etc.

Psychological quality training: Combining the characteristics of air traffic control work, carry out psychological quality training projects such as stress management, teamwork, emergency response, etc. At the same time, improve students' stress resistance and teamwork ability through sports and physical fitness classes.

4.2.2. Teaching Methods and Means

Situational teaching: Introducing actual scenarios of air traffic control work in physical education teaching, allowing students to train in a simulated environment, enhancing the pertinence and effectiveness of teaching.

Information technology means: Using modern information technology means, such as virtual reality (VR), augmented reality (AR), etc., to create a more realistic training environment for students and improve training effectiveness.

Integration of in class and out of class activities: Encourage students to apply the knowledge and skills learned in physical education classes to extracurricular sports activities, forming good exercise habits and healthy lifestyles.

4.3. Assessment and evaluation system

Diversified evaluation: Adopting a diversified evaluation approach that focuses not only on students' physical fitness indicators and psychological performance, but also on their teamwork and innovation abilities.

Process evaluation: Emphasize the evaluation of students' training process, timely identify and correct students' problems during training, and promote students' continuous progress.

Feedback mechanism: Establish an effective feedback mechanism to enable students to timely understand their training effectiveness and existing problems, so as to adjust training plans and methods in a timely manner.

5. The Importance of Sports in The Field of Regulation

Sports play an important role in the field of control, especially in high-intensity and high-pressure areas such as air traffic control, which cannot be ignored. The following are detailed explanations of several aspects

5.1. It can improve physical fitness and endurance

Enhancing physical fitness: Air traffic controllers need to maintain a highly concentrated mental state for a long time, which places high demands on their physical fitness. Sports can effectively improve the physical fitness level of employees, enhance their cardiovascular function, and enable them to maintain stable physical condition in high-intensity work environments.

Improving endurance: Long term work and emergency response require controllers to have good endurance. By engaging in physical activities such as long-distance running, swimming, and other aerobic exercises, one can significantly improve their endurance level, enabling them to maintain efficient working conditions over long periods of time.



Figure 3. Organize sports such as running on campus

5.2. It can enhance psychological resilience and stress resistance

Relieve stress: Controllers often face tension and pressure at work, and sports as an effective way to relax can help them alleviate the psychological pressure brought by work and maintain a good mentality.

Enhancing self-confidence: By participating in sports competitions and team sports, air traffic controllers can cultivate a sense of competition and teamwork, enhance self-confidence and self-efficacy, which helps them to face various challenges more confidently in their work.

Improving adaptability: Rapid response and flexible adaptability in sports are equally important for air traffic controllers. By participating in sports such as basketball and table tennis that require

quick reflexes and flexible adaptability, controllers can exercise their reaction speed and adaptability to better cope with unexpected situations at work.

5.3. Can promote team collaboration and communication

Enhancing team awareness: Teamwork projects in sports can promote communication and collaboration among controllers, and enhance team cohesion. This kind of teamwork ability is particularly important for fields such as air traffic control that require highly collaborative work. Improving communication skills: In sports, controllers need to learn how to effectively communicate with others to achieve common goals. This communication skill is also applicable to work scenarios and helps improve the efficiency and quality of communication between controllers and colleagues, superiors, and subordinates.

5.4. Can cultivate good work habits and lifestyle

Developing exercise habits: Incorporating sports into daily life can encourage air traffic controllers to develop good exercise habits, which is of great significance for maintaining physical health and improving work efficiency.

Promoting a healthy lifestyle: By participating in sports, air traffic controllers can cultivate a healthy lifestyle, such as a balanced diet and regular routines, which plays an important role in improving overall health and work performance.

6. Specific Measures to Improve Physical Fitness and Endurance

Improving physical fitness and endurance is a comprehensive process that involves multiple aspects such as diet, exercise, rest, and psychological regulation. Here are some specific measures aimed at helping individuals comprehensively improve their physical fitness and endurance.

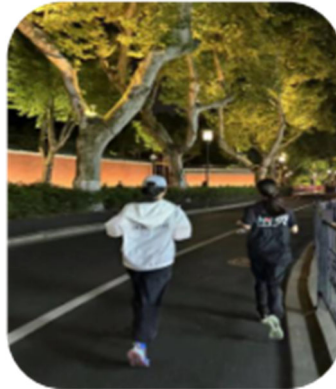


Figure 4. Do sports such as jogging

6.1. Reasonable diet

A reasonable diet is the foundation for improving physical fitness and endurance. It is necessary to ensure a balanced intake of nutrients and eat more fresh vegetables and fruits. These foods are rich in vitamins, minerals, and dietary fiber, which can help promote metabolism and enhance immunity. At the same time, it is important to supplement high-quality proteins in moderation, such as fish, meat, eggs, milk, etc. These proteins are important raw materials for muscle growth and repair. Reduce the intake of high sugar and high-fat foods to avoid the risk of obesity and cardiovascular disease. In addition, maintaining sufficient water intake and maintaining water balance in the body are crucial for improving endurance.

6.2. Regular exercise

Exercise is the key to improving physical fitness and endurance. It is recommended to engage in at least 150 minutes of moderate intensity aerobic exercise per week, such as jogging, brisk walking, swimming, cycling, etc. These exercises can enhance cardiovascular function, improve the body's ability to utilize oxygen, and thus enhance endurance. In addition, combining strength training such as weightlifting and pull-up exercises can enhance muscle strength and endurance, and improve overall physical fitness. During exercise, the principle of gradual progress should be followed, gradually increasing the intensity and duration of the exercise according to one's own situation, to avoid injuries caused by excessive exercise.

6.3. Adequate sleep

Adequate sleep helps the body recover and repair, promotes metabolism, and enhances immunity. Adults need 7-9 hours of sleep per day, preferably before 10 pm at night. Good sleep habits help regulate the body's endocrine system, maintain stable bodily functions, and thus improve physical fitness and endurance.

6.4. Psychological regulation

Being in a state of tension, anxiety, or depression for a long time can affect physical health, reduce resistance and endurance. Therefore, it is important to learn how to regulate emotions and maintain a positive mindset. You can relax and relieve stress by listening to light music, meditation, reading, and other methods. At the same time, communicating and sharing with family and friends can also help alleviate negative emotions.

6.5. Avoid bad habits

Smoking, excessive drinking, staying up late and other unhealthy habits can damage physical health, affect the immune system and metabolic function.

We should try to avoid these bad habits as much as possible and develop a healthy lifestyle. Smoking cessation, alcohol restriction, regular sleep, moderate exercise, balanced diet and other healthy behaviors will help improve physical fitness and endurance.

6.6. Professional guidance and regular physical examinations

In the process of improving physical fitness and endurance, one can seek guidance from professional coaches or doctors to develop a scientifically reasonable exercise plan based on their own situation. At the same time, regular physical examinations can help to timely understand one's physical condition, identify potential health problems, and take corresponding measures for adjustment and treatment.

6.7. Diversified forms of exercise

Don't limit yourself to one type of exercise, try different sports projects. Diversified exercise methods can exercise different muscle groups and improve cardiovascular function, enhancing overall physical fitness. For example, combining various forms of exercise such as swimming, running, yoga, etc. can comprehensively improve physical fitness and endurance.

6.8. Perseverance and perseverance

Improving physical fitness and endurance is a long-term process that requires persistent effort and persistence. Don't give up your exercise plan due to temporary fatigue or setbacks. Maintaining a positive mindset and firm beliefs will help you overcome difficulties and achieve lasting results.

7. Conclusion

In summary, good physical fitness is of paramount importance to aviation safety^[3]. The organic combination of physical education courses and core courses in aviation control can effectively enhance students' physical fitness, psychological resilience, and professional skills. It not only helps to improve the physical fitness and endurance of air traffic controllers, enhance their psychological resilience and stress resistance, but also affects the operational efficiency and safety of the entire aviation system. Therefore, the Civil Aviation Administration of China's Air Traffic Control Bureau and related agencies should attach great importance to the physical fitness training and health management of aviation staff to ensure aviation safety.

In addition, with the continuous development of aviation technology and the continuous improvement of aviation safety standards, the physical fitness requirements for aviation staff will also be more stringent and comprehensive. Therefore, aviation staff should continuously strengthen their physical training and psychological adjustment ability training to meet the needs of future aviation safety work. At the same time, improving physical fitness and endurance requires multiple efforts and persistence. Through the comprehensive application of measures such as reasonable diet, regular exercise, sufficient sleep, psychological regulation, avoiding bad habits, professional guidance, and regular physical examinations, it is regarded as an important way to improve personal abilities and work efficiency. Looking ahead to the future, with the continuous advancement of educational concepts and technology, the integration of physical education courses with core courses in aviation control will become closer and deeper, making greater contributions to the cultivation of high-quality and high skilled aviation control talents.

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