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Feasibility Study on the Application of Civil Drones in Physical Education Teaching in Universities

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Abstract: With the continuous development of technology and the increasing maturity of drone technology, civilian drones have been widely used in various fields. Drones can serve as auxiliary tools in physical education teaching, enriching the content of physical training and improving teaching effectiveness. In addition, drones can also shoot sports competitions, performances and other activities, providing valuable materials for later review and analysis. Therefore, it is feasible to apply civilian drones to the teaching of physical education majors in universities, which can enhance students' learning interest and effectiveness.

1. Introduction

Civil drones are a new type of intelligent device that integrates aviation, electronics, and computer technology, and their application fields are becoming increasingly widespread. In the field of education, drones have been applied to geographic information collection, educational research, practical teaching, and other aspects, achieving certain results. However, in the teaching of physical education majors in universities, the application of civilian drones is still relatively rare. With the development of the times and the deepening of education and teaching reform, how to apply drone technology to the teaching of physical education majors in universities has become an urgent problem to be solved. Therefore, this study aims to explore the feasibility of the application of civil drones in the teaching of physical education majors in universities, and provide certain reference and guidance for the improvement and innovation of physical education majors in universities.[1]

2. Overview of civil drone technology

Civil drones, also known as "civil aircraft drones" or "unmanned aerial vehicles", are robots that fly autonomously through remote control or preset programs, without the need for human driving, and can complete various tasks. Civil drones are mainly composed of the fuselage, remote control system, sensors, autonomous control system, and data link.

The fuselage is a fundamental component of civil drones, and its structure and appearance can be designed according to different usage scenarios, generally including wings, fuselage, power devices, and sensors. The remote control system is the control center of civil UAV, which can realize the takeoff, landing, hovering, attitude control and other functions of UAV.[2] The remote control system

can be wired or wireless, usually consisting of a remote control and a receiver. Sensors are an important component of obtaining information for civilian drones, mainly including cameras, LiDAR, meteorological instruments, etc. Among them, cameras can perform video shooting, LiDAR can perform high-precision 3D surveying, and meteorological instruments can obtain meteorological data. Autonomous control system is an intelligent control system for civil unmanned aerial vehicles, which can achieve autonomous flight and obstacle avoidance functions of unmanned aerial vehicles. Autonomous control systems generally include computers, inertial navigation systems, GPS, obstacle avoidance radar, etc. The data link is a channel for civilian unmanned aerial vehicles to transmit data, mainly including image transmission systems and command transmission systems. The image transmission system can transmit the video captured by the camera to the ground station, and the command transmission system can transmit the commands from the ground station to the drone.[3]

3. The application advantages of civil unmanned aerial vehicles in physical education teaching in universities

3.1. Expanding perspectives and enriching teaching content

The use of drones in teaching physical education majors in universities can provide students with a more comprehensive and three-dimensional observation perspective, thereby helping them better understand the skills and movements of athletes. Compared to traditional observation methods, using drones can observe athletes' performance from a higher perspective, avoiding the problem of insufficient information caused by limited perspective in traditional observation methods.[4] For example, in football matches, drones can overlook the entire field from a high altitude, capturing the movement trajectory and tactical changes of players on the field. Through these shots, students can better understand the players' movements and coordination. In basketball games, drones can capture players' detailed movements such as dribbling, passing, and shooting, helping students gain a deeper understanding of technical essentials and operational skills. In addition, using drones can help students better analyze the environment and venue conditions of the competition site, thereby providing them with more comprehensive sports analysis and guidance suggestions.

3.2. Improve teaching effectiveness and promote students' interest in learning

Using drones for teaching physical education majors in universities can provide students with more vivid and intuitive teaching methods, thereby better stimulating their interest in learning. By using drones to capture athletes' competition or training scenes, more scene details can be displayed, allowing students to more intuitively experience the athletes' skills and abilities in practice. For example, in football matches, drones can capture various details of the field from different angles, including players' movement, passing, shooting, defense, and other aspects. This shooting not only helps students better understand the rules and technical essentials of football matches, but also allows them to gain a deeper understanding of athletes' psychological states and coping strategies during the game.

In addition, using drones for teaching physical education majors in universities can also enhance students' sense of experience to a certain extent. With the development of technology, students' acceptance of traditional teaching methods is becoming lower and they prefer to learn knowledge and skills through interaction and experience. By using drones for teaching, students can better experience the atmosphere and scenes of competitions or training through real-time shooting and playback, thereby gaining a deeper understanding and mastery of sports professional knowledge.

3.3. Improve student movement sports skills and realize individualized teaching

In traditional teaching methods, teachers usually need to teach in the form of a whole class, and

cannot provide personalized guidance based on the actual situation of students. This method may make some students feel inadequate. The application of drones can provide more flexible teaching methods. Teachers can guide students through targeted training by controlling the flight trajectory of drones, and provide real-time evaluation and guidance on students' performance. For example, in football matches, drones can adjust the shooting angle and tracking speed according to the actual situation of different students, helping them better master offensive and defensive skills, thereby achieving better teaching results. In addition, drones can also help teachers monitor and analyze students' movement status in real-time, thereby better understanding their actual situation and providing more scientific basis for personalized teaching.

3.4. Improve safety and reduce teaching costs

Using drones for teaching physical education majors in universities can not only improve the efficiency and quality of teaching, but also reduce teaching costs and improve teaching safety. Traditional physical education teaching usually requires a large amount of sports equipment and venues, which are expensive. Moreover, for some difficult sports such as rock climbing, safety issues cannot be ignored. Using drones for teaching can significantly reduce the cost of sports equipment, reduce the occupation of venues, avoid safety issues during difficult sports, and ensure the safety of students. In addition, drones have flight control systems and autonomous obstacle avoidance functions, which can better ensure the safety of the teaching process. This efficient, safe, and low-cost teaching method can better provide high-quality teaching experiences for students majoring in sports.

3.5. Promoting teaching innovation and improving teaching quality

Using drones for teaching physical education majors in universities can promote teaching innovation and improve teaching quality. With the development of drone technology, its application fields continue to expand, bringing more innovative points and possibilities to teaching. For example, drones can be combined with virtual reality technology to provide students with more realistic training scenarios and experiences; It can be combined with robot technology to achieve more intelligent teaching guidance and evaluation; It can be combined with big data technology to achieve more accurate motion analysis and training plan development, etc. These innovative points and possibilities can not only improve the quality and effectiveness of teaching, but also provide students with more diverse and diverse learning experiences, stimulating their innovative thinking and practical abilities.

4. Feasibility analysis on the application of civil drones in physical education teaching in universities

4.1. Technical feasibility

With the rapid development of drone technology, civilian drones have gradually become an important tool in teaching. The high-definition videos and images captured by drones can not only help students better understand and master sports skills, but also promote students' interest and learning enthusiasm. During the teaching process, drones can be accurately adjusted and controlled according to actual needs to achieve more perfect shooting effects. In addition, drones can also be used for real-time monitoring and recording of students' movement performance, providing teachers with more accurate evaluation criteria, and promoting personalized teaching and evaluation of students. Therefore, from the perspective of technological application, it is very feasible to apply civil drones to the teaching of physical education majors in universities, which will bring more exciting experiences and high-quality teaching effects to teaching.

4.2. Feasibility of teaching needs

In the teaching of physical education majors in universities, using civilian drones for teaching can provide students with a more attractive learning experience, stimulate their interest and enthusiasm for learning. At the same time, using drones for teaching can also break through the limitations of traditional teaching methods, break the constraints of time and space, and enable students to better understand the practical application of sports skills. In addition, the high-precision shooting and data collection functions of civilian drones can provide more comprehensive and detailed data support for athletes' technical training and competition performance, which is conducive to students' comprehensive understanding of sports skills and improving their overall quality. Therefore, using civilian drones for teaching physical education majors in universities has broad application prospects and important significance.

4.3. Economic feasibility

Although the price of civilian drones is relatively high, resource sharing can reduce the economic burden on schools. The sharing of drone teaching resources can reduce the purchase and maintenance costs of each university without affecting the teaching effectiveness. In addition, the use of drones also requires professional personnel to operate and maintain them, which can be solved through shared resources. On the basis of sharing resources, universities can also exchange teaching content and resources to further improve teaching quality and effectiveness. Therefore, from the perspective of sharing economy and resource utilization efficiency, it is feasible to apply civilian unmanned aerial vehicles to the teaching of physical education majors in universities. At the same time, with the development of drone technology and the intensification of market competition, the price of drones is expected to be further reduced in the future, further improving the feasibility of applying drones to teaching.

4.4. Safety feasibility

With the development of civil drone technology, its application in physical education teaching in universities is receiving increasing attention. From the perspective of safety feasibility, the application of civil drones in teaching physical education majors in universities is feasible, but the following aspects need to be noted. Firstly, signage and warnings should be provided in the drone flight area to ensure teaching safety. For the flight area inside the school, obvious signs and warning signs should be set up to remind teachers and students to pay attention to drone flight. For off campus flight areas, appropriate venues should be selected under the guidance of relevant departments to ensure the safety of drone flight. Secondly, develop relevant safety operating procedures to ensure the safety of drone operators and teachers and students. The operation of drones should be carried out by personnel who have undergone professional training and assessment to ensure that they possess sufficient skills and experience. Meanwhile, teachers and students should maintain a safe distance while watching drone flights and filming to avoid accidents. Finally, the maintenance and upkeep of drones should be carried out by professional personnel. If any malfunctions or problems are found during the use of drones, they should be immediately stopped and professional maintenance personnel should be sought for assistance. When storing and transporting drones, it is also necessary to pay attention to relevant safety precautions to ensure the integrity and safety of the drones.

4.5. Legal feasibility

The application of civil drones in physical education teaching in universities requires compliance with relevant laws and regulations to ensure legal and compliant teaching. Firstly, it should comply with national and local drone management regulations, such as drone usage permits, airspace

management, flight safety, etc. Secondly, relevant privacy protection laws and regulations should be followed to protect the personal privacy of teachers and students from infringement. The consent of the students themselves and their parents or guardians should be obtained when the UAV takes and collects the performance data of student movement 'sports. Meanwhile, drones should strictly control the storage and use of data to protect data security and privacy. Therefore, from the perspective of legal compliance, the application of civilian unmanned aerial vehicles in teaching physical education majors in universities is feasible, but it is necessary to comply with relevant laws and regulations to ensure that teaching is legal and compliant.

4.6. Social feasibility

The application of civil drones in teaching physical education majors in universities has broad social feasibility. Firstly, it can promote teaching reform and innovation in physical education majors in universities, improve teaching quality and effectiveness, and cultivate sports talents with more comprehensive qualities. Secondly, the sharing and exchange of drone teaching resources can promote cooperation and collaboration between universities, improve the utilization efficiency and sharing efficiency of educational resources. Finally, the application of drones in physical education teaching in universities can also promote the development and innovation of the sports industry, and promote the application and development of drone technology. Therefore, from the perspective of social significance, the application of civilian unmanned aerial vehicles in the teaching of physical education majors in universities is very feasible and has important social significance and value.

5. Conclusion

Overall, drone technology has been widely applied in multiple fields, and its application in sports has gradually been explored. Drones can provide a more comprehensive perspective in sports competitions, shooting matches from different heights and angles, and providing more intuitive data and information for teaching. Civil drones have broad application prospects and teaching value in physical education teaching in universities, but at the same time, universities need to develop corresponding management measures and standards to ensure safety and teaching effectiveness.

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