

# An Investigation into the Informational Teaching Design of the Principles of Flight Course



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**Abstract:** With the rapid development of information technology, the education teaching mode has gradually stepped into the era of informatization. In the field of higher education, the principle of flight course, as an important theoretical course, provides solid support for cultivating the basic quality and ability of aviation students. Taking the principle of flight course as an example, this paper analyzes the current problems in the teaching design of the principle of flight course and discusses in depth the application strategies of informatization teaching design in improving the teaching effect and enhancing the practical ability of students, aiming to provide a reference for the promotion of the reform of informatization in education and teaching.

**Keywords:** principle of flight course; informatization; instructional design

## Introduction

Principles of Flight course is a theoretical course required for aviation majors, which plays an important role in students' mastery of flight principles and methods, and improvement of practical ability and innovation ability. The rapid development and wide application of informatization technology provide brand-new ideas and methods for the teaching design of the principle of flight courses. Therefore, it is of great practical significance to explore how informatization teaching design can be applied to the principle of flight courses to promote the development of aviation education and teaching.

## 1. Current Problems in the Teaching Design of the Principles of Flight Course

### 1.1. Disconnection between theory and practice

Although the main goal of the principle of flight course is to cultivate students' understanding and application of the principle of flight, there is often a disconnection between theory and practice in the actual teaching process. The main source of this problem is the improper teaching methods. The

traditional principle of flight courses relies too much on classroom teaching and the transfer of theoretical knowledge, often ignoring the importance of practical operation (Sha et al., 2022). In the classroom, the teacher mostly teaches in a one-way transmission mode, and students are often in a passive state of accepting knowledge, lacking the opportunity for actual operation and practical exercises. This leads to the fact that students are unable to organically combine theoretical knowledge with actual flight operations, and are unable to experience and understand the application of theoretical knowledge in practice. In addition, the lack of practical sessions is also one of the reasons for the disconnection between theory and practice. In the principle of flight courses, students often lack sufficient practical opportunities, and it is difficult to consolidate and deepen theoretical knowledge through practical operation (Zhang, 2022). In traditional classroom teaching, teachers rely excessively on book knowledge and explanations of theoretical models, which prevents students from truly understanding and mastering the practical application of flight principles. Due to the lack of practical sessions,

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students are often unable to gain actual flight experience, which makes it difficult to understand and apply flight principles.

### **1.2. Lack of interaction and participation**

Traditional flight principle courses usually adopt the method of teacher lecturing and student listening, which puts students in a passive state of accepting knowledge and lacks opportunities for interaction and participation (Li, 2022). This one-way transmission teaching method limits students' enthusiasm and initiative and easily makes students' understanding of knowledge and ability to apply it not deep enough. At the same time, the lack of interaction and participation also leads to fewer opportunities for communication and cooperation among students. In the Principles of Flight course, students can work together to solve problems and improve their thinking and problem-solving abilities through mutual discussion, collision of ideas, and group cooperation. However, the traditional teaching mode often restricts communication and cooperation among students, missing the opportunity to cultivate their teamwork and communication skills. In addition, the lack of interaction and participation also leads to a lack of clarity in students' understanding and mastery of course content. By relying solely on listening to lectures and passively receiving information, students do not have enough opportunities to ask questions, discuss, and practice to deeply understand and apply what they have learned. This can affect students' complete understanding of the principles of flight and make it difficult to integrate theoretical knowledge with practical applications.

## **2. The Significance of Computerizing the Instructional Design of the Principles of Flight Course**

### **2.1. Enhance the learning effect of students**

Teachers use informatization means to carry out elaborate teaching designs of the principle of flight course, which can provide students with richer and more diversified learning resources, to stimulate students' enthusiasm and enthusiasm for learning.

Through the means of information technology, various forms of learning resources can be effectively integrated, such as text, images, audio, video, etc., to provide students with more intuitive, vivid, and diversified learning materials. Such teaching design can not only fully stimulate students' interest in learning and enhance their learning initiative, but also meet the learning needs of different students, so that each student can find the most suitable way of learning for him/her, thus improving the learning effect. In addition, through the information technology platform, teachers can tailor-make personalized learning paths and learning resources for students according to their learning situations and characteristics. For example, by utilizing the learning analysis function of the learning management system, teachers can understand the learning progress and level of each student in real-time, to recommend suitable learning content and learning activities for them. At the same time, teachers can also provide students with real-time learning support through online Q&A and instant feedback, helping to solve the problems they encounter in their learning and further enhancing the learning effect. What's more, the informatization platform also provides a wealth of learning resources and learning tools, so that students can make independent choices and explore learning according to their interests and needs. At the same time, students can also complete learning tasks with their classmates through online discussion and collaborative editing (Yang, 2023). In this way, students can participate more actively in the learning process, which is conducive to improving the learning effect.

### **2.2. Enhance students' practical ability**

In the traditional principle of flight courses, many practical operations need to be carried out in the laboratory or the field, but due to the limitation of time and space, students may not be able to experience and practice in person. In contrast, through the information technology teaching platform, teachers can use tools such as virtual experiment software and simulators to provide

students with rich practical scenarios and simulation environments for actual operations. Students can assemble, debug, and control the flying machine in the virtual experiment, and carry out the simulation operation of various flight missions, to gain practical experience and skills. In addition, the flight principle involves many complex physical principles and engineering calculations, and the online simulation experiment can help students simulate and analyze the flight principle through computer models and algorithms. Students can observe and analyze the flight principles in real-time through parameter setting, data acquisition, and experimental operation on the online experiment platform. In this way, students can intuitively understand the physical laws and engineering problems in the actual flight process, and enhance their practical ability and problem-solving ability. In addition to virtual simulation experiments, teachers can also provide students with real or virtual flight cases through the information technology platform, so that students can play the role of pilots or engineers and participate in the planning, execution, and evaluation of actual flight missions. Students can design, optimize, and test the performance of flight vehicles in the simulation environment to solve real problems and challenges. Such hands-on cases and projects can help students apply their theoretical knowledge to real-world situations and develop hands-on and teamwork skills. Therefore, by formalizing the teaching design of the Principles of Flight course teachers can not only cultivate students' problem-solving and teamwork abilities but also help to enhance their practical abilities.

### **3. Strategies for Computerizing the Instructional Design of the Principles of Flight Course**

#### **3.1. Integration of virtual experiment platform and simulation software**

With the development of information technology, virtual experiments and simulation software have become indispensable auxiliary tools in the field of education. For the teaching design of the principle of flight course, skillfully integrating

the virtual experiment platform and simulation software can significantly improve the efficiency and quality of classroom teaching. First of all, virtual experiment platforms and simulation software can provide students with a more realistic and intuitive experimental operation and simulation experience (Yin et al., 2022). Students can carry out various flight experiments and simulation operations on the computer to feel the operation process and mechanism structure of the flight principle in a more immersive way, to better understand and master the relevant knowledge. Secondly, the integration of virtual experiment platforms and simulation software helps to improve students' practical operation ability. Students can carry out several experiments and operations on the computer to fully master the relevant skills and methods, improve their practical operation ability, and make sufficient preparation for the actual flight operations in the future. In addition, the integration of virtual experiment platforms and simulation software can also realize the effective combination of classroom teaching and independent learning. The application of virtual experiment platforms and simulation software allows students to study and practice operations anytime and anywhere inside and outside the classroom to further deepen their understanding and mastery of related knowledge and skills. At the same time, students can also use the Internet and other information technology to obtain more relevant resources and materials to further enrich their learning content and methods, and improve independent learning ability.

#### **3.2. Construct remote test system and cloud platform**

"Building a remote test system and cloud platform" is one of the important strategies to computerize the teaching design of the principle of flight courses. Currently, the construction of a teaching experiment platform for the principle of flight based on Prepar3D flight simulation software and high-performance flight trainers is widely discussed (Si et al., 2019). When building the remote test system and cloud platform, teachers need to consider factors such as hardware equipment and

software environment. Hardware equipment mainly includes computers, servers, sensors, and other equipment, which can be transformed and assembled based on existing hardware equipment, and may need to be upgraded and updated to meet the needs of the remote test and the cloud platform to ensure the stability and usability of the system. The software environment, on the other hand, mainly includes the operating system, application software, database, and other aspects, and open-source or commercial software can be selected for development and deployment. In terms of function and module design, the remote test system needs to provide sharing of experimental equipment and test data, support remote control and monitoring of the experimental process, and be able to collect and analyze experimental data in real-time. At the same time, the cloud platform needs to provide functions such as the release and management of online course resources, the management of students' course selection and examination, and the submission and grading of students' assignments and experiments. In terms of implementation and testing, it is necessary to analyze and test the requirements with teachers and students as the main user groups and provide adequate technical support and training. However, attention also needs to be paid to issues such as data security and privacy protection to ensure the reliability and stability of the system.

### 3.3. Scientific use of interactive teaching tools

Interactive teaching tools include multimedia teaching software, simulation software, virtual experimental platforms, etc., and these tools should have the characteristics of visualization and intuition, interactivity and flexibility, as well as real-time and feedback, to ensure that they can realistically simulate and demonstrate the scenes and processes related to the principle of flight, to support the students' active learning and exploration, to meet the learning needs and styles of different students and to record and assess the student's learning status and results in real-time. It can also record and assess students' learning status and outcomes in real time, and provide timely feedback and suggestions. When

selecting and combining interactive teaching tools, teachers need to choose appropriate teaching tools and resources for the teaching objectives and content of the Principle of Flight course, such as "Super Star Learning Channel", to prevent over-reliance and abuse affecting the teaching effect and quality (Kan, 2021). In terms of multimedia teaching software, teachers need to consider the selection and editing of audio and video, animation, pictures, and other elements to ensure that the content is clear and vivid; in terms of simulation software and virtual experiment platforms, teachers need to consider the design and implementation of algorithms, data models, graphical interfaces, etc., to ensure that the simulation effect is accurate and real; at the same time, teachers also need to consider the version updating and management of teaching resources to ensure that the quality of teaching is continuously improved. and management of teaching resources to ensure the continuous improvement of teaching quality.

### 4. Providing Diverse Evaluation Feedback

In the Principles of Flight course, evaluative feedback is crucial to students' learning and teachers' teaching. By providing diversified evaluation feedback methods, teachers can better understand students' learning, identify problems, adjust teaching strategies (Wang et al., 2019), and stimulate students' learning interest and enthusiasm. Diversified evaluation feedback methods include both real-time feedback and regular feedback. Real-time feedback can give students timely guidance and advice in the learning process so that students can correct their mistakes and improve their learning methods in time. For example, in the flight simulation experiment, a real-time feedback system can be set up to monitor and evaluate the operation process of students and give real-time tips and guidance. Regular feedback, on the other hand, can make a comprehensive evaluation of students' learning over some time, discover students' problems and deficiencies promptly, and provide targeted counseling and support. In addition, diversified evaluation and

feedback methods also include individualized and group levels. Individualized evaluation feedback can give targeted evaluation and guidance according to the different characteristics and needs of students. For example, special tutorials and training materials can be provided to help students improve their abilities in areas where they are weak. Group-oriented evaluation feedback, on the other hand, can evaluate the learning of the whole class or team with the help of an online evaluation system, which promotes students to become a learning community and promote and learn from each other.

### Summarize

In summary, by exploring the informatization teaching design of the principle of flight course, this paper finds that the application of informatization technology can enable students to carry out flight operations and real-time data monitoring on the virtual experimental platform and simulation software to enhance their practical ability; the construction of a remote experimental system and a cloud platform allows students to carry out experimental activities at any location, which is no longer restricted by the time and location of the laboratory; at the same time, the interactive teaching tools and the provision of diverse evaluation feedback methods and other measures can stimulate students' sense of independent learning and methods, and cultivate their critical thinking and innovation ability. In the context of education and teaching informatization reform, these measures provide teachers and students with more teaching and learning methods, and offer new opportunities and challenges for the development of aviation education.

### Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

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