Application of Feedback Control Law in Track and Field Teaching and Computer Simulation Training

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Abstract. At present, the effective integration of information technology and feedback control law represented by computer simulation training can effectively collect and manage the sports information of athletes, so as to improve the scientificity and rationality of athletes' training, so it has important research value. Based on this, this paper first analyzes the theory and method of track and field teaching and training, then studies the application of feedback control law in track and field teaching, and finally analyzes the application of feedback control law in track and field computer simulation training.

Keywords: Feedback Control Law, Computer Simulation Training, Track and Field Teaching

1. Introduction

With the iterative development of social economy and the improvement of people's living standards, people's attention to physical fitness is constantly improved, especially the application of modern technology in physical education[1]. On the other hand, the application of computer information technology in all walks of life greatly promotes the progress of related industries, especially in the application of sports track and field teaching, which can effectively collect and manage the sports information of athletes, so as to enhance the scientific and reasonable training of athletes. And through the accurate analysis of the process of track and field exercise, it can effectively guide the effectiveness of athletes' movements.

Sports track and field teaching as a form of sports which requires high accuracy of athletes' movements requires students to master the following several aspects as shown in Figure 1, so as to further improve the level of sports technology and achieve the purpose and task of sports track and field teaching effectively[2].

At present, feedback control method based on computer technology is commonly used in track and field teaching. This method is a theory based on precise control and feedback, which can record and feedback athletes' team formation, material selection, body, skills, tactics and psychology, and realize the accurate supervision of athletes' track and field training in this process. This method integrates the theory of track and field training, and gradually develops into the basic principle of modern sports training. Based on the feedback control law, it could effectively grasp...
the essential laws of track and field training, so as to help track and field athletes obtain better training effect.

Figure 1. Skill requirements of athletics.

In addition, most schools still adopt more traditional teaching methods and methods in track and field teaching. In addition to teaching some action essentials and a series of process of teachers' personal demonstration, the fewer teachers adopt other flexible control simulation methods to improve the intuitiveness, experience and interaction in the teaching process. In the traditional track and field teaching mode, both the teaching tools and the teaching theories adopted are relatively conservative, and there is room for improvement in the effect and efficiency. These traditional teaching methods are shown in Table 1 below. These traditional track and field teaching methods can improve students' sports skills to a certain extent, but with the development of computer simulation training technology and the deepening of application in related fields, the track and field teaching process is more scientific and intuitive, teaching effect and efficiency can also be improved to a greater extent. Therefore, the study of feedback control law in track and field teaching and computer simulation training has important practical value.

Table 1. Traditional teaching methods of athletics.

| Methods                      | Contents                 | Features            |
|------------------------------|--------------------------|---------------------|
| Technical action demonstration action | Language explanation | Hard to understand  |
| Action decomposition         | Body language            | Relatively intuitive|
| Teaching equipment           | Wall chart or picture    | Static display      |
| Basic skill                 | Common teaching equipment| The effect is relatively poor |
|                             | Theoretical explanation  | Relatively abstract |

2. Theory and method of track and field teaching and training

2.1. The basic content of sports training in track and field teaching

Track and field teaching is a special education process for training track and field athletes. Its main training tasks include the following aspects: training students' good will of sports and improving their track and field performance\(^1\). Secondly, it also includes the improvement of students' theoretical knowledge and the ability of track and field teaching, training and organization. The basic contents of the specific sports training are shown in Figure 2 below. In which, the physical training level of students is mainly to enhance the functional ability of various organs and systems of the human body. The training process includes comprehensive physical training based on realizing body balance and special physical training focusing on improving track and field skills. Secondly, in the level of technical training, it is mainly to improve students' track and field special skills, including technical
exercises and complete technical exercises. In addition, at the tactical training level, it is mainly to improve students' understanding of sports tactics, as well as the analysis of competitors and the ability to develop competitive strategies. Tactical training often needs to be combined with the actual physical quality of students, the level of sports skills and willpower and other elements of the comprehensive development and development.

Recovery training is mainly to use a variety of means and methods to eliminate the physical and psychological fatigue of students after training and competition[4]. The methods and methods mainly include physical recovery, medical recovery and psychological recovery. At the level of moral will and psychological training of students, the main purpose is to improve their self-confidence and willpower, so that they can adapt to the atmosphere of training and competition psychologically. Finally, in the theoretical learning and education level, mainly based on the basic theoretical knowledge of track and field teaching, strengthen students' understanding of track and field, and formulate and organize the training process, including the special technical principles of track and field competition.

![Basic content of track and field teaching](image)

*Figure 2. The basic content of track and field teaching.*

2.2. Methods of track and field teaching and training

First of all, in the level of strength training of students, it is mainly to improve the basis of mastering track and field sports technology and improve sports performance[5]. The strength training methods and means mainly makes students' strength ability get effective development and improvement, and mainly with the help of weight-bearing training, such as the teaching of different load intensity and load. Secondly, in the teaching method of speed and strength quality, it mainly includes weight-bearing teaching and non-weight bearing teaching. In the aspect of teaching methods and means of strength endurance quality, it mainly relies on special strength endurance and general strength endurance. In addition, the speed teaching of students is mainly based on reaction speed training, movement speed training and displacement speed training. Finally, on the level of track and field talent selection, the specific work steps and processes are shown in Figure 3 below.
3. Application of feedback control law in track and field teaching

3.1. Establish feedback information control mode
The track and field teaching plan based on feedback control law needs to be based on the predetermined teaching purpose as the input of feedback control mode. Secondly, in the process of implementing teaching, the internal structure of teaching system will change, which is the result of teaching plan implementation. In addition, if there is a big difference between input and output, it is necessary to control the content of track and field teaching, so as to establish an effective positive feedback loop between input and output.

3.2. Track and field optimization teaching based on feedback control law
In the process of track and field athletes' learning, it is very difficult for them to have no deviation in their movements. Therefore, it is necessary for instructors to give effective guidance to ensure the accuracy of students' sports. Secondly, in the process of developing new sports instructions, the students need to be guided based on the high standard of track and field, so as to ensure the accuracy of the guidance process. In addition, after the track and field long-distance mobilization completes the related movement guidance, the instructor needs to compare its movement with the standard movement, so as to find out the gap and make further correction. In this process, we need to take the athletes' actions as the input, and the feedback in training is based on the actual exercise results as the actual output, so as to realize the positive feedback to the input variables. The delay of time may lead to the increase of interference factors and affect the effective control of track and field teaching. After comparing with high standard movements, coaches need to instruct athletes to carry out training based on standard movements in the next exercise.

3.3. The function of feedback control in track and field teaching
Feedback control law has many functions in track and field teaching, mainly reflected in the four levels of information transmission, immediate feedback, information amplification and comprehensive dialectics, as shown in Figure 4 below. Among them, in the transmission function level, it is mainly to play the role of teachers in accordance with their aptitude, so as to ensure that the feedback information of track and field athletes is true. Secondly, on the level of instant feedback, track and field athletes need to establish information contact with teachers based on information feedback, so as to ensure that the feedback information is transmitted immediately and clearly, so as to ensure that students' movements can be corrected in time. In addition, in the amplification level, feedback control can obtain the change state of the whole track and field training system based on a small amount of information, so as to ensure the training level and quality of students. At the comprehensive and dialectical level, it can realize the overall improvement of input and output variables, ensure the overall planning of track and field teaching activities based on the actual situation of students, so as to further reduce the blindness of track and field teaching.
5. Application of feedback control law in track and field computer simulation training

4.1. Application of feedback control law in track and field computer simulation training
At present, the sports teaching represented by track and field has realized the role of modern teaching technology represented by computer simulation training, and more and more applied to computer simulation training, which has gradually developed into an important part of the reform of limit education. However, the vast majority of sports colleges and universities still use the traditional sports teaching mode to carry out track and field teaching. In this case, it is difficult for students to realize their main learning position and ignore the students' feeling of successful experience of sports fun. Most of the students still passively accept the theoretical teaching of teachers. In addition, specific to the track and field teaching level, there are still some specific problems, such as the deviation in understanding, the backward means, the low technical quality, the lack of resources, the limitation of site conditions, and the difficulty in using resources.

4.2. The function of feedback control law in track and field computer simulation training
With the development of computer information technology represented by computer simulation training, its integration with feedback control law effectively promotes the quality and efficiency of track and field teaching. Feedback control law has the following functions in track and field computer simulation training teaching. First of all, it further improves the main position and role of students, and improves the effect of track and field teaching. Secondly, it arouses the enthusiasm of students and promotes their interest in track and field. In addition, it helps to establish the correct concept of technical action, and can better implement individualized teaching based on students' differences. Finally, it can better solve the key points and difficulties in teaching, and improve the teaching ability of teachers and students' learning effect of track and field.

5. Conclusion
In summary, in track and field teaching, the feedback control method based on computer technology is often used. This method is a theory based on precise control and feedback, which can record and feedback athletes' team formation, material selection, body, skills, tactics, psychology, etc., and realize the accurate supervision of athletes' track and field training in this process. Through the analysis of the theory and method of track and field teaching and training, this paper studies the teaching and training methods of track and field. Through the research on the application of feedback control law in track and field teaching, the function of feedback control law is analyzed. Through the analysis of the application of feedback control law in track and field computer simulation training, its application status and application effect are studied.

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