

Research on the Application of Science and Technology in Competitive Sports

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Abstract: The history of competitive sports has proved to us that competitive sports and sports science and technology are inseparable. Competitive sports is an important place for the application and transformation of sports science and technology achievements. The application of material technology, multidisciplinary systems engineering, and sports psychology in the practice of competitive sports enables athletes to continuously stimulate the potential of human movement and constantly create and approach human physiological limits. The world record of China has promoted the continuous development of competitive sports in the direction of “higher, faster and stronger”.

1. Introduction

With the continuous development of competitive sports, science and technology are increasingly used in training and competitions. Material science, biomechanics, psychology and other disciplines can help athletes better master the laws of sports, stimulate their own sports potential, and continuously improve the level of sports competition. Therefore, the scientific and rational use of modern science and technology is conducive to promoting the development of competitive sports to a higher level.

2. Application of Material Technology in Competitive Sports Practice

Material technology is widely used in competitive sports training and competition, and it plays a vital role in the improvement of athletes' sports performance. This is mainly reflected in the innovation of sports equipment. The new records of some competitive sports projects rely on the improvement of sports equipment to a certain extent. With the continuous development and improvement of the competitive level of various events, the role of sports equipment in the competition will become more important. In order to ensure the fairness of all participating athletes in international competitions, the International Olympic Committee and international individual sports federations and other competitive sports organizations will make corresponding regulations on the specifications of the competition equipment for each event. For example, the pole material of pole vault can be divided into four stages: wood pole, bamboo pole, metal pole and fiberglass pole. Each innovation of the material brings a great breakthrough in the world record of pole vault.¹ In 1952, lighter, tougher, and more flexible fiberglass poles were used for the first time at the Helsinki

Olympic Games, bringing pole vaulting into a new era of leaping. In 1961, the famous American athlete Davis set the world record for the first glass fiber brace with 4.83 meters. And in 1962, the then IAAF officially allowed the use of fiberglass rods. In 1964, American athlete Fred Hansen raised the world record to 5.28 meters. Afterwards, the pole vault players of various countries chased after me. “One wave is not flat, one wave appears again”, constantly setting the world record.

From the perspective of the evolution of the pole vault equipment and the development of the world record, each innovation in equipment technology brings about a qualitative leap in sports performance, which plays a vital role in the improvement of the world record, and athletes continue to break through and challenge themselves. Physiological limits and the need to pursue higher performance have reversed the continuous development, innovation and innovation of sports equipment technology. The technology of sports equipment and the performance of the event restrict each other, interact with each other, and promote common progress, showing a development relationship of co-evolution.

3. Application of Multidisciplinary System Engineering in Competitive Sports Practice

With the continuous development of world competitive sports, the competition level of various competitive sports is increasingly approaching the human physiological limit. In addition to factors such as athletic talent and hard training, the application of scientific and technological achievements in training methods has attracted more and more attention. The influence of the technical support of subject system engineering in competitive sports is becoming more and more obvious. Technical support elements include relevant domestic and international scientific research institutions, relevant colleges and universities, and relevant technology companies. Most of the technical support elements are non-sports scientific research units, but rely on their scientific research capabilities in their own industries to assist the core elements in solving technical difficulties in the process of scientific and technological innovation. At the same time, as the degree of internationalization increases, more high-level technical support elements of the international industry have been introduced. Public technologies including non-sports patented technologies are widely used in athletes' daily training, such as key technical movements, complete sets of technical movements, competition tactics, sports training management, athlete selection, sports injury prevention and rehabilitation, sports fatigue recovery, Sports nutrition, sports test statistics, sports rehabilitation therapy, sports inventions, anti-unfair competition, competition rules, competition arrangement, sports inventions, etc.² These sports non-patent technologies comprehensively involve multiple disciplines and are intertwined and integrated to form a huge multi-disciplinary system engineering. The development of modern sports science and technology presents a general trend of both high integration and differentiation. Electronic communication technology is used in sports training practice to scientifically monitor training load and physical recovery; computer simulation and mathematical model building technology are widely used in tactical analysis, diagnosis, improvement, and training.

The Olympic motto of “faster, higher, stronger” inspires every athlete to constantly surpass themselves and challenge the limits of human physiology. As an important practice activity of human society, competitive sports has its own scientific connotation and special laws. Only the training process of competitive sports includes the scientific selection of athletes, systematic training arrangements, technical diagnosis, physical recovery, physical function evaluation, Medical supervision and other links. Competitive sports training has entered a scientific and rational era. With the continuous improvement of the competitive level of various events, it is increasingly difficult to improve sports performance and win championships or set world records in international

competitions. According to statistical studies by Russian scholars, the phenomenon of “improving athletic performance” involves more than 150 factors, including physical fitness, technology, tactics, psychology, intelligence, function, and many social factors. The research on this phenomenon includes anatomy, physiology, Contents in dozens of disciplines including medicine, biomechanics, biochemistry, psychology, management, education, genetics, economics, and histology.

4. Application of Sports Psychology in Competitive Sports Practice

In the field of sports psychology, the most closely integrated with practice is the psychological monitoring of athletes. Sports psychologists can help athletes find the source of psychological or emotional problems through related psychological diagnosis and monitoring, so as to use scientific methods to prevent problems, improve sports conditions, and enhance athletes' competitive level.³ In addition, the scientific intervention of the two-factor model of mental health to guide sports psychologists should not only focus on the repair and resolution of problems, but the daily training and guidance of athletes' positive psychological qualities are more important. This whole-process guidance can not only help athletes to actively repair and adjust when facing psychological problems, so as to obtain the best competitive state with a comprehensive and positive psychological quality. And it can provide a certain reference for revising the training plan, adjusting the training rhythm, and changing the training intensity.

In the two-factor model of mental health, the purpose of mental health intervention includes three parts: repair, prevention, and development. Repair and prevention are for negative states, and development for positive qualities. Under the guidance of its theory, athletes' mental health is no longer limited to overcoming psychological problems, but also takes the cultivation and development of athletes' positive qualities as the fundamental goal, which will help athletes' overall psychological development and their best competitive performance. When the psychological needs are paid attention or satisfied, the generation of internal motivation and the internalization of motivation are easier to achieve. The satisfaction of psychological needs contributes to the enhancement of a sense of vitality and the promotion of health.⁴ Therefore, researches on athletes' mental health based on the perspective of positive psychology should deepen their connotations, enrich intervention methods on the basis of scientific experiments, and pay attention to the impact of the interaction between personal psychological qualities and the environment. Special attention should be paid to the personalized guidance of high-level athletes to help athletes have a good mental state before, during and after the game.

5. Conclusion

International competitions such as the Olympic Games, the World Cup, and the individual World Championships provide an excellent “technical test site” for the application and transformation of sports scientific and technological achievements. At the same time, it has also become a platform for exchanges of sports scientific and technological achievements among countries around the world, enabling new sports technology used in the competition Achievements and scientific and technological knowledge are rapidly spread and transmitted, which promotes the continuous development and progress of sports technology.

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