

RESEARCH ON THE POSITIVE TRANSFER OF CROSS-COUNTRY ROLLER SKATING TO ALPINE SKIING SKILL LEARNING

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Summary: *In recent years, alpine skiing, as one of the important sports of winter sports, its training methods have attracted widespread attention to improve physical and skill quality. Some people have proposed to combine cross-country skiing with cross-country skating to carry out this project sport to promote the development of ice and snow sports. Studies have proven that learning cross-country skating can positively influence the basic technical qualities of alpine skiing. Therefore, we hope to create a better and higher level experience by building a school ice and snow sports development system and incorporate it into the education model. In order to promote the development of ice and snow sports, we need to actively build a campus ice and snow sports development system. This can include cross-country roller sports courses and camps in schools, providing professional instructors, and setting up ski clubs and competitions. Through these initiatives, more young people can be trained to participate in ice and snow sports, improve their technical level and interest, and thus inject new vitality into the development of ice and snow sports.*

Keywords: *Alpine skiing; Cross-county roller skating; Positive migration; Physical fitness; Motor skills*

With the successful conclusion of the 20th National People's Congress of our country. China's sports industry and physical education and teaching have once again ushered in rapid development and progress. General Secretary Xi Jinping pointed out in the report of the 20th National Congress of the Communist Party of China that it is necessary to strengthen the implementation of youth sports to promote the comprehensive development of mass sports and competitive sports, and accelerate the process of building a "sports power". The report also specifically mentioned that "Chinese-style modernization is the modernization of material civilization and spiritual civilization", in which sports also play an important role in improving the spiritual literacy of Chinese people. In September 2019, the General Office of the State Council of China also issued the "Outline for the Construction of a Sports Power"[1], which proposed that "by 2035, the youth sports service system will be more complete and physical literacy will be greatly improved"; In October

2020, the General Office of the CPC Central Committee and the General Office of the State Council issued the "Opinions on Comprehensively Strengthening and Improving School Physical Education in the New Era"[2], improving the construction and equipment of venues, improving sports competitions and talent training systems, etc.; In August 2021, the General Administration of Sports and the Ministry of Education issued the Notice on Printing and Distributing Opinions on Deepening the Integration of Sports and Education to Promote the Healthy Development of Adolescents[3], including physical education subjects in the scope of junior and senior high school academic level examinations, and improving the youth sports event system, etc., and the sports exhibition industry has come to an era of vigorous development.

Snow sports have also grown by leaps and bounds with the holding of the 2022 Beijing Winter Olympics. General Secretary Xi Jinping pointed out that "ice and snow are also gold and

1. Research direction is physical education training

silver mountains", and through a series of policy documents issued by the State Council and the General Administration of Sports to promote the development of sports, China's ice and snow sports have also achieved a qualitative leap. In recent years, the popularity of ice and snow sports among the masses has increased significantly, the number of ski resorts has increased year by year, and the number of people participating in snow sports has also increased with the popularity of snow sports. In the context of China's vigorous promotion of ice and snow sports, because snow sports are greatly affected by environmental factors and seasonal factors, simplified land sports projects of snow sports are born, these land imitation projects are led by cross-country skates, and gradually enter mass sports, becoming an indispensable part of the development and progress of snow sports in China.

As the "crown jewel of the Winter Olympics", alpine skiing has successfully registered 307 athletes in the alpine skiing sub-event of this Olympic Games, covering more than 80 countries and regions, including many countries in the tropics and subtropics where snow is simply impossible. This shows the breadth and influence of alpine skiing around the world. In competitive sports, the training and competition of alpine skiing events have basically overcome many objective factors such as the environment and seasons through the countries and regions participating in this Winter Olympics. In mass sports, how to continue to experience snow sports in non-snow season or geographical environment conditions is not allowed, and can learn and master snow sports skills more quickly in the snow season or under the condition of adapting to the environment has become a very worthy of consideration. In order to alleviate the impact of non-snow season and other objective environmental factors on the masses to carry out snow sports, this study introduced "cross-country skating" sports as a medium to help the masses get rid of the constraints of time, space

and other environmental factors, and improve the learning ability, skill mastery ability and quality of alpine skiing special sports.

1. Introduction to cross-country roller sports

1.1. Cross-country roller skating

Cross-country skiing is a type of snow sport in which skis and poles are used as tools to glide through hills and snowfields.[4] It was included as an official Olympic sport at the 1924 Chamonix Winter Olympics. Roller-Ski Skating, on the other hand, is a land simulation of cross-country skiing that slides on snow-free surfaces. The overall cross-country pulley tool is similar to the cross-country skiing tool, but the cross-country pulley is less restricted and can be practiced on ordinary plastic tracks, asphalt roads and other venues.

As a terrestrial derivative of snow sports, cross-country skating can also experience the fun of snow sports when the public is affected by the environment, season and other factors. This study mainly explores that through a certain period of teaching practice, when the subjects have a certain degree of mastery of cross-country skating technology, and then go to real snow to learn snowboarding-related movements, the learning speed of snowboarding-related movements is faster than that of subjects who learn snowboarding movements directly on snow. It can effectively improve its control of attitude, posture and speed; And it can better avoid sports injuries that may occur during skiing. Therefore, the purpose of this study is to explore whether the practice of cross-country skating can promote the learning of technical movements related to alpine skiing during the snow season when there is real snow during the snow season, and whether the positive migration relationship between projects occurs between projects by practicing cross-country skating when it is not possible to perform alpine skiing normally during the snow season or when alpine skiing cannot be carried out normally due to environmental factors. The above aspects can lead to the main research objectives of this

study, including the following two aspects:

(1). The technology of the cross-country skating project has a more comprehensive exercise for the subject's body during the exercise, so the subject's own sports quality will be greatly improved in the process of practicing the cross-country pulley. Having a high level of physical fitness is an important part of learning to master the skills related to alpine skiing. Therefore, when the subjects' physical fitness is improved after the cross-country skating system is improved, and then the snow skiing technique is practiced, the learning progress is relatively fast and the body control will be relatively good. Therefore, the purpose of the first part of the study is to explore the transfer effect of systematic cross-country skating practice on the quality of alpine skiing specific sports.

(2). The technical movements and specialized motor perception of cross-country skating events and alpine skiing events are similar. There are similarities in the movement patterns and force situations between projects. Therefore, when objective factors such as the environment and the season do not allow real snow or dry snow to practice, will it promote the learning of cross-country skate-related technical movements on land, and then start to learn skiing movement techniques when there are conditions to practice on real snow?

1.2. Alpine skiing

Alpine skiing, also known as "Alpine skiing", is a snow racing sport that uses skis, snowshoes, bindings and ski poles as the main tools to slide from the mountain to the bottom along the Qimen route. The Alpine region is the birthplace of modern alpine skiing[5] and includes several countries such as Italy, France, Switzerland, Austria and Germany. Alpine skiing was born when Austrian "Ski Pope" Zedalsky invented the short snowboard in 1890,[6] followed by the invention of effective bindings and special technology for alpine skiing.

Alpine skiing appeals to athletes in all disciplines because it requires athletes to

complete the entire course of movement on their own and is considered one of the most outstanding forms of physical fitness [4]. With a variety of technologies and evolving sports, skiers and athletes are constantly looking for ways to improve training, endurance and overall performance. Alpine skiing has many health-related benefits that help any athlete enhance specific training on or off the snow. While there are many benefits, the main benefit of downhill skiing is that it provides a well-rounded workout [7]. To fully enjoy the benefits of downhill skiing, athletes need to maintain good fitness and focus on high-intensity training throughout the year. Similar to most other sports, as the sport progresses, athletes must strive to keep up with the strength and endurance training required to remain permanently competitive on the arena. This means that they will not only focus on improving their skills during the season, but also use the offseason to train and adjust.

For alpine skiing, without proper training, it will be difficult to continue where you left off [8]. While running is an option, this form of land training only works the leg muscles, while other body parts may lose strength. In order to train the body holistically and achieve the most desirable results, many athletes seek to do cross-training programs [9]. In cross-country skiing there are many benefits, one of which is its ability to regulate those muscle groups that are overlooked in daily exercise. When high-performance athletes stop their daily workouts, a variety of physiological changes occur. After several months of training cessation, athletes may develop physical dysfunction, resulting in the loss of previous strength training effects [10]. These effects include a decrease in aerobic capacity, muscle strength, muscle memory, and a significant reduction in maximum oxygen uptake [11]. The goal of this study is to explore ways to learn and master alpine skiing techniques during the non-ski season and apply them to alpine skiing programs.

(1). Alpine skiing teaching

As alpine skiing continues to grow, the sport itself is no longer limited to professional competitions. The public's understanding of alpine skiing has gradually changed from professional competitions to their own learning and experience, so the public alpine skiing teaching activities were born. Alpine skiing teaching has become an indispensable professional course for colleges and universities to establish an ice and snow course system and cultivate ice and snow teaching talents. Some people believe that alpine skiing teaching is the schedule of different schools to impart the theoretical knowledge and practical process of alpine skiing [12], and this teaching process includes important contents such as teaching objectives, teaching concepts, and teaching methods. Some scholars pointed out [13] that alpine skiing teaching is based on summarizing and absorbing the teaching advantages of other sports, in order to reduce the difficulty of ski teaching and protect the safety of students, adopt certain teaching methods and methods, enhance the attractiveness of skiing by explaining relevant ski movement skills, and attract more students to participate in the series of skiing processes.

(2). Sports positive transfer

Positive transfer refers to the acquisition of one motor skill that has a favorable effect on the learning of another motor skill [14]. The migration between sports categories mainly covers two aspects, namely the transfer of sports quality and motor skills. Skill transfer, that is, actively looking for similarities in movement patterns and homogeneity of movement structures between different sports types, and transferring accordingly. The migration of sports quality is mainly the transfer of physical fitness between projects, including the migration of common factors in the two sports, including the related factors of physical endurance, speed, strength, etc.

2. The significance of cross-country skating and cross-country skiing project migration

Similar inter-program migration studies

have been conducted on many projects, but there are still gaps regarding migration between alpine skiing and cross-country skating events. Therefore, this study attempts to study the phenomenon of positive migration between items in the learning process of cross-country skating in alpine skiing. The theoretical significance and practical significance of the positive influence of cross-country skating on the learning of alpine skiing were discussed, and it provided a reference for promoting the development of China's ice and snow industry.

(1). Theoretical significance

The transfer of cross-country skating to alpine skiing can enrich the relevant theoretical system of snow sports teaching development. Increase public participation and understanding of snow sports. After searching and exploring relevant literature, relatively few studies have been found to be on migration between snow sports. This study can promote the application of methods and methods to enhance the migration between snow sports events, and improve the possibility of migration and application between related sports.

(2). Practical significance

The migration of cross-country skating to alpine skiing helps to enrich alpine skiing teaching methods; Improve the learning progress and interest of students in the process of alpine skiing teaching; improve the physical fitness of mass participants in alpine skiing; so that the masses can participate in snow sports all year round; Enable more people to participate in and experience snow sports, and effectively promote the popularization and development of snow sports in China.

3. The positive migratory effect of cross-country skating on technical movements in alpine skiing

Research on cross-country skating and alpine skiing technology system

(1). Alpine skiing technical system and characteristics

From the above figure, we can know that alpine skiing mainly has two major technical

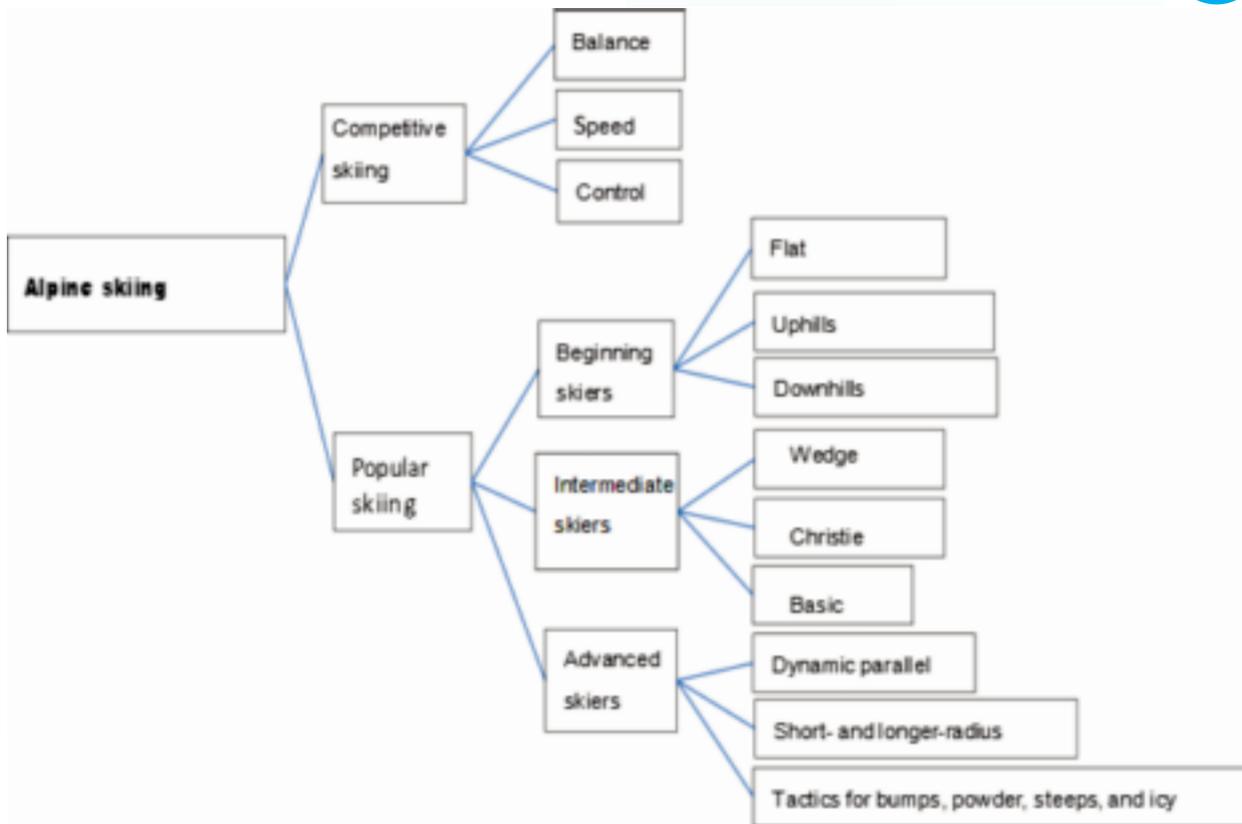


Figure 1 Alpine skiing technical system

systems, namely: competitive skiing and public skiing, and the two types of technologies have a certain correlation. Because the groups involved in mass skiing are more extensive than competitive skiing, the division of its technical system is more specific and detailed. It can effectively improve the public's own understanding and awareness of the learning progress and situation of alpine skiing. The technical system of competitive skiing is relatively single, mainly serving alpine skiing competitions. Since this paper mainly studies the influence of cross-country skating on the technical movements of mass skiing in alpine skiing. The technical system of competitive skiing is only briefly summarized in this article and is not the main research content of this paper.

Alpine skiing is different from the "two-dimensional movement" performed on a flat surface[15] in that it is a "three-dimensional" movement that slides from a high place to a low place. The subject's displacement on the snow mainly depends on the influence of the earth's

gravity, and as the displacement increases, according to the formula between gravitational acceleration and displacement: $S=Vt+gt^2/2$, the subject's speed will become faster and faster. Therefore, in Volkswagen skiing, with effective braking as the most basic technology, it is necessary to first learn braking technology, and then carry out the learning of plough turning, semi-plow turning, parallel turning, carbine turning and other levels of turning technology. The turning action technique seems simple, the legs are flexed and supported, and the center of gravity changes with the movement of the body, but in fact the fine movements are very demanding, the action structure is complex, a turning action includes the body's forward and backward movement, lateral movement, rotation movement and vertical movement, while accelerating and continuous turning with the help of the information of ski poles and snowboards, alpine skiing has high requirements for human strength, balance, sensitivity, coordination, endurance and reaction ability [16].

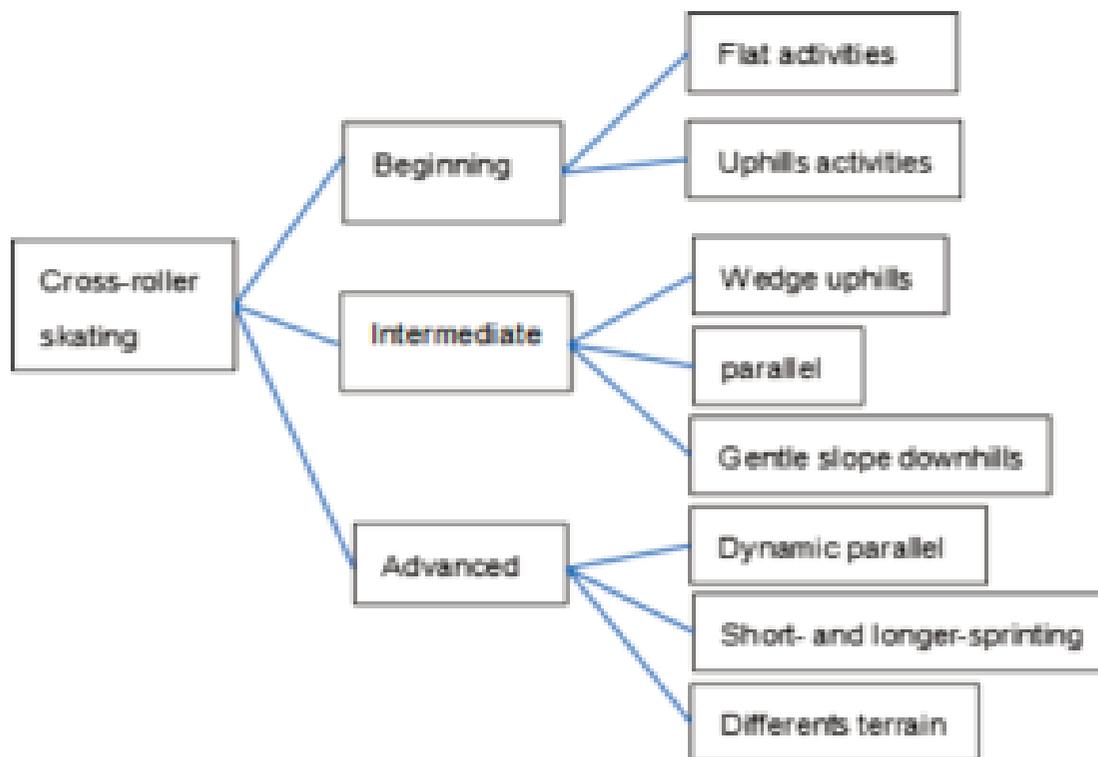


Figure 2 Off-road pulley technology system

(1) Cross-roller skating technical system and characteristics

As can be seen from the above figure, the technical system of off-road pulleys is mainly divided into three layer-by-layer progressive levels, from beginner to advanced. Its technical system standards are suitable for assessing the public's acquisition of off-road pulley skills. There are three main traveling technologies of off-road pulleys, namely: alternating step sliding, double cane synchronous propulsion sliding, stride pedal sliding, step turning is the only turning technology of off-road pulleys, and the sliding braking action is also relatively single. After mastering the basic sliding movements, turning movements, and braking movements, you can practice sliding on different roads and slopes, and the sliding technique of cross-country skating wheels is basically similar to cross-country skiing technology. Classified according to the dominant factors of competitive ability, short-distance racing behavior physical fitness dominated speed events, long-distance skating behavior physical fitness dominated endurance

events. In the process of gliding, the muscles of the whole body need to work together to propuls and show strength, speed, endurance, coordination, sensitivity, balance and flexibility.

(2). Cross-country skating is affecting the quality of alpine skiing special sports

This paper studies the positive migration of cross-country skating on the quality of alpine skiing special sports, and finally concludes that the practice of cross-country skating can effectively have a positive migration effect on the sports quality related to alpine skiing. In this part of the study, the subjects used the cross-country skating to learn the two alpine skiing special sports quality tests, and the data of each item before and after the two tests were counted, and the nine related test items were divided into five main influencing factors: explosive sensitivity coordination factor, limb muscle speed endurance factor, waist and abdominal muscle speed endurance factor, balance factor, and flexibility factor. The contribution rate of each factor and its corresponding test items were analyzed for the characteristics of alpine skiing and cross-country skating.

It was found that most of the movements of cross-country skates can have a certain effect on the main physical fitness required for alpine skiing, especially in the three qualities of explosiveness, sensitivity and coordination. The effect of speed and endurance of the limbs is weaker than that of explosiveness, sensitivity, and coordination quality; Weaker in lumbar and abdominal muscle endurance than in speed endurance in the limbs; Relatively weaker in terms of balance quality; Flexibility quality is the factor that has the weakest influence of cross-country skates on the athletic quality of alpine skiing.

After further analysis, it is found that the main reason for the influence of cross-country skating on the physical fitness of alpine skiing events is that the action mode, power generation mode, energy supply mode (cross-country skating short-distance racing) between the two are relatively similar, so the practice of cross-country skating can effectively promote the development of alpine skiing-related special sports quality, and the improvement of special sports quality has a positive effect on the learning of technical movements of alpine skiing itself, so it can be seen that cross-country skating has a positive migration effect on the quality of alpine skiing special sports.

(3) Cross-country skating has a positive impact on the technical skills of alpine skiing

In this paper, the positive transfer of cross-country skating to the technical skill quality of alpine skiing is finally concluded, and the final conclusion of the study is that the practice of cross-country skating technical movements can effectively have a positive transfer effect on the learning of some technical movements of primary in alpine skiing. In this part of the study, the subjects were divided into 2 experimental groups and 2 control groups, the independent variables between the experimental group and the control group were whether they had learned cross-country skating, and the independent variables between the experimental group and the control group were sports students and

ordinary students (that is, there was a certain exercise foundation and no exercise foundation).

The experimental group was taught and practiced the technical movements of cross-country pulleys, and the time for alternating strides, stride pedals, synchronous propulsion of double canes, land in-situ steering, and off-road pulley braking was recorded, and the five technical movements were fully mastered; Subsequently, the four groups were taught and practiced alpine skiing snow technical movements, and the time for alternating sliding steps, flat pedals, simultaneous propulsion, snow in-situ steering, and plow braking was recorded. The acquisition time of four groups of two techniques with similar cross-country skating and alpine skiing techniques was compared and analyzed.

The results showed that after learning the alternating stride, stride pedaling, synchronous propulsion of double cane, land in-situ steering, cross-country pulley braking, and five technical movements of the off-road pulley, and then went to alpine skiing alternating sliding step, flat pedaling, simultaneous propulsion, snow in-situ steering, and plow braking, the learning speed and mastery of alpine skiing-related techniques were significantly improved in the five technical movements, indicating that the learning effect of cross-country pulley technology was positively correlated with the learning effect of alpine skiing technology. The two control groups that had not learned cross-country pulley-related technical movements had significantly slower learning and mastery than the two experimental groups that had learned cross-country skating when they first learned basic alpine skiing-related technical movements.

3. CONSLUSION

After further analysis, it is found that the main reason for the influence of several technical movements related to cross-country skating on some technical movements of alpine skiing is that the action mode and power mode

between the two are very similar, and the special quality of alpine skiing is also improved in the process of cross-country skating learning. Therefore, the practice of cross-country skating has a positive land imitation effect on several movements of alpine skiing introductory, which in turn promotes the subjects' practice of basic introductory movements of alpine skiing, which shows that cross-country skating has a positive migration effect on the basic introductory technical quality of alpine skiing.

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