Analysis of modern methods of teaching landing techniques in alpine skiing

https://doi.org/10.65149/eajss.2026.v6i3.a009

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Abstract

Currently, much attention is being paid to analyzing downhill technique in alpine skiing. Researchers are focusing on studying the effectiveness of various approaches that allow athletes to improve their performance. Of particular interest is the analysis of movement, balance, and weight distribution during landing. Modern technologies such as video recording and computer modeling are being actively used to study technique in detail. This helps to identify key aspects that affect the speed and safety of athletes. In addition, attention is being paid to adapting technical methods to different track conditions, including terrain and snow conditions. The results of the research are being used to develop new training methods that allow athletes to achieve maximum performance. This article reviews modern research in the field of alpine skiing, aimed at improving downhill techniques that help athletes improve their skills and safety.

Key words: skiing, biomechanics of sports, equipment of alpine skiers, quality criteria.

Introduction

Modern research in the field of downhill skiing opens up new horizons for the development of the sport in competitive conditions. Scientists and coaches are focusing on optimizing movements, increasing endurance, and minimizing injuries. Innovative technologies such as biomechanical analysis and computer modeling allow for a detailed study of the dynamics of the descent, improving the technique of athletes. Particular attention is paid to adapting the methods to the individual characteristics of skiers, which helps to achieve maximum efficiency. Introducing smart materials into equipment and developing routes that take climate change into account opens up new opportunities for progress [2,4,6].

Currently, downhill skiing is actively studied, which is associated with the development of technology and increasing demands on sports achievements. Scientists and coaches are analyzing new approaches to training athletes, improving technique and increasing safety. The use of modern materials and equipment that optimize skier movements and reduce the risk of injury, as well as the study of psychological aspects that affect skiing performance, such as concentration and stress management, will help to organize the training process more effectively.

The development prospects of alpine skiing in the 21st century are associated with the integration of innovative technologies for analyzing and improving technique, including artificial intelligence and virtual reality. This opens up new opportunities for training athletes and improving their performance in international competitions. In addition, the integration of artificial intelligence helps analyze data in real time and suggest optimal launch strategies. Thus, the sport of skiing continues to evolve, combining tradition with advanced technology, making it more fun and safer. Thus, the search and analysis of modern research aimed at creating more effective and safe methods that will help alpine skiers reach new heights in the sport remains relevant. [1,3,5].

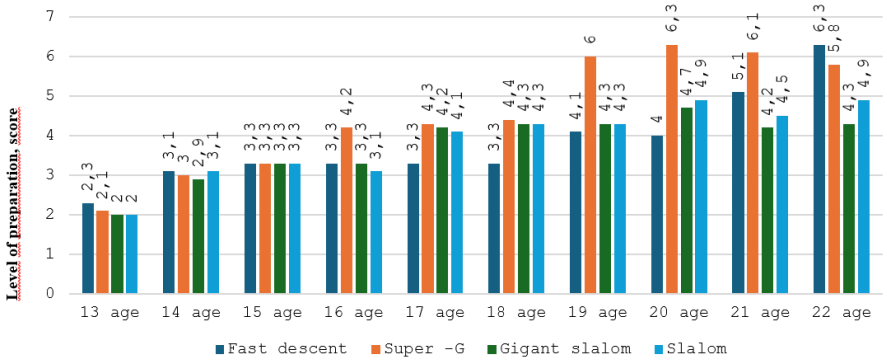
Purpose of the study The aim of the project is to analyze modern methods of teaching downhill skiing techniques and develop a comprehensive approach based on assessing the movement patterns of skiers when they descend sports slopes.

Organization and results of the study. Modern research into downhill skiing techniques aims to optimize athletes' movements to achieve maximum speed and control. Scientists are analyzing biomechanics, aerodynamics, and equipment materials to minimize drag and increase efficiency. The introduction of technologies such as 3D modeling and motion sensors allows for detailed study of every aspect of the descent.

The prospects of the new century are associated with the development of artificial intelligence and machine learning, which will help adapt training to the individual characteristics of athletes. Also, the use of innovative composite materials for skis and suits allows them to be stronger and lighter.

Alpine skiing requires the athlete to solve complex movement tasks during skiing. This is

Fig 1. .Assessment of technical preparation of alpine skiers of different ages in alpine skiing sports: youth and adults (boys).



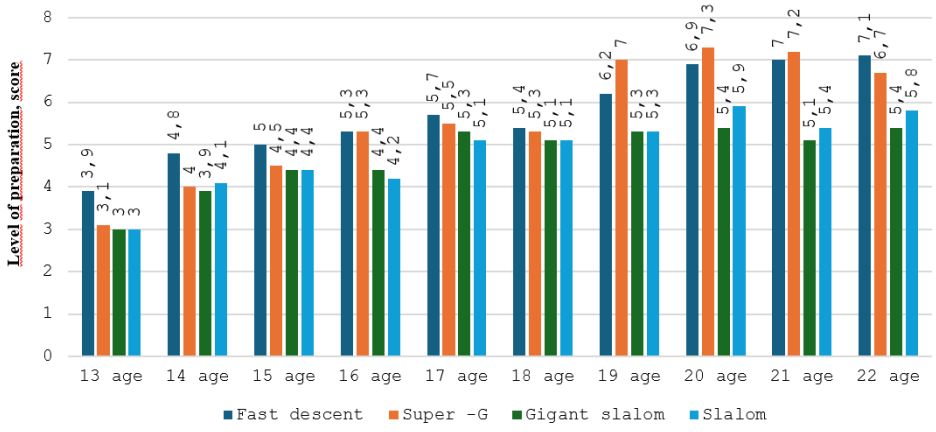
due to the need to maintain balance on a sliding surface, control the movement of the total center of mass of the "skier-skier" system along curved trajectories with varying radii, as well as adapt to the changing terrain of the slope and the state of the snow cover. In such conditions, the skier is forced to develop a special system of movements in sports practice, which is called the technique of this sport. [1].

The perfection of this technique determines the athlete's ability to perform descents easily, confidently and gracefully, striving to achieve maximum speed both on and off the prepared tracks. In studies devoted to analyzing the technique of the world's leading athletes, the externally observed system of movements is

skier does not allow us to determine the main factor - the reason why the entire system moves along the desired trajectories and changes the speed of descent. In this regard, several attempts have been made over the past century to identify the forces acting on this system during its decline.

The research used an expert assessment method, which involved the most qualified coaches in Uzbekistan. Expert groups consisted of 5-7 people. Each expert was given clear instructions indicating the object of assessment and the assessment criteria. The scores were given on a 10-point scale, with the highest score corresponding to the perfect execution of the movements of the best alpine skiers (world

Fig 2. .2- group. Assessment of technical preparation of alpine skiers of different ages in alpine skiing sports: youth and adults (girls).



becoming the object of study. For this purpose, to the film and video recording methods are widely used, and their results have been reflected in to many scientific works.

However, analyzing the movements of a

or Olympic champions) or a generalized image characterizing the effectiveness of the technique. An effective technique is understood as an athlete's movement system aimed at controlling the descent along the track, ensuring mini-

Table. Technical training in alpine skiing and correlation of participation in successful competitions

Type of alpine skiing	*Coefficients*	*Men 17 years and older*	*For boys 14-16 ages*	*Women 17 years and older*	*For girls 14-16 years*
Going down	R	- 0.79	- 0.72	- 0.83	- 0.62
	D	0.62	0.52	0.69	0.38
Super-G	R	- 0.71	- 0.69	- 0.88	- 0.70
	D	0.50	0.48	0.77	0.49
Gigant slalom	R	- 0.70	- 0.65	- 0.87	- 0.89
	D	0.40	0.42	0.76	0.79
Slalom	R	- 0.85	- 0.71	- 0.84	- 0.87
	D	0.72	0.50	0.71	0.76

mal resistance to braking forces under various conditions and maximizing the athlete's movement potential. The expertise was carried out in two stages using the Delphi method, and then the consistency and reliability of the experts' opinions were analyzed.

The study determined the technical and tactical preparation parameters of skiers of different age groups and regions in all disciplines of alpine skiing. The results are summarized in graphs 1 and 2, where the preparation levels of athletes are displayed in the vertical direction in the form of average group scores by discipline, and in the horizontal direction in the form of the age of the participants. Data analysis allows us to note a more significant age dynamics in speed events (downhill and super-G), which is especially pronounced in women. At the same time, in technical disciplines (slalom and giant slalom), a less rapid increase in indicators was observed for all groups. This confirms the widespread opinion about the complexity of improvement in these sports due to the need to perform complex movement movements (a series of quick turns) in a limited time. In addition to the average group scores, individual results were obtained for international masters of sports and amounted to 7.5-8.5 points.

We also determined the correlation between the athletes' technical training indicators and their competition results, calculated using the Brave-Pearson coefficient, depending on their age. [10]. 1- table (R) This information is statistically significant. The table also shows the coefficients of determination, which represent the squares of the corresponding correlation coefficients (D) values are also shown.

Results and discussion

Technical training plays a key role in achieving high results in alpine skiing. It involves mastering and improving the skills necessary to effectively control skis on various trails. Without the appropriate level of technical training, athletes will have difficulty performing complex elements, which will negatively affect their results. In addition, technical training helps reduce the risk of injury, as the correct execution of movements minimizes the load on the body. This is especially important in conditions of high speed and complex terrain of ski slopes.

Thus, technical preparation is an integral part of the training process and directly affects the success of athletes. Its development requires systematic work and attention from coaches and athletes themselves.

According to the table, the sporting achievements of experienced alpine skiers and high-level female alpine skiers depend mainly (with rare exceptions) on their technical training by 60-70%. This confirms the widespread perception of alpine skiing as a discipline that requires high technical skills, involving the complexity of movement movements in changing conditions and with limited time to perform them.

In 14-15 year old boys, the results show less dependence on technical training (40-50%), which, in our opinion, is due to the incomplete process of sexual maturation. Girls of the same age can achieve high success in speed events even with a relatively low level of technical preparation (40-50%), but in slalom and giant slalom, women's results are significantly more dependent on technical skill (about 80%).

Considering their age characteristics, 14-15-year-old boys are more likely to develop physical qualities such as strength, endurance, and coordination, which partially compensates

for the lack of technical training. However, as age increases, with the completion of puberty, the role of technical skills becomes more significant, approaching the performance of adult athletes. This is due to the need to perform complex movements at high speed and in conditions of high risk. [6].

In fast-paced disciplines such as speed skating, girls can achieve success due to their natural flexibility, reaction speed, and psychological stability. However, in technical disciplines such as slalom and giant slalom, where precision and control are required, technical preparation becomes a key factor. This is due to the need to perform complex turns and maneuvers in a confined space. [1].

Thus, technical preparation remains a key element of success in alpine skiing, especially in disciplines that require high precision and control. However, its importance varies depending on age, gender, and the specifics of the discipline, which should be taken into account when designing the training process.

Conclusion

The development of technologies in the field of alpine skiing opens up new opportunities for analyzing and improving athletes' techniques. The use of artificial snow on surfaces allows you to create comfortable conditions for training, which is especially important for accurately assessing the dynamics of movement. Tensile dynamometric platforms integrated into training areas allow for the measurement of forces generated by the interaction of skis with the ground surface, which is a key factor in minimizing braking.

Real-time computer registration and calculation systems are capable of analyzing data with high accuracy by determining optimal ski trajectories and slope angles. This allows the technique to be adapted to the individual characteristics of the athlete, taking into account the athlete's anthropometry, morphology, and psychophysiological parameters.

In addition, such systems can be integrated with virtual reality, which allows for the modeling of various track conditions and weather phenomena, increasing the flexibility of athletes. This is especially important for preparing for competitions in conditions that cannot be replicated on open slopes.

Thus, the combination of artificial snow, modern measurement technologies and computer analysis opens up new opportunities for improving the technical preparation of alpine skiers, making the training process more effective and scientifically based.

References

Alekseeva, N. D., Ivachev, A. A., Zinovyev, A. N., & Zinovyev, A. A. (2019). Biomechanical phases of performing an alpine skiing turn on a simulation trainer. *Uchenye zapiski universiteta imeni P. F. Lesgafta*, (3), 11–13.

Joubert, J. (2001). Alpine skiing technique: The conceptual revolution of the 1990s. *Gornye lyzhi. Ski*, (2), 36–39.

Lisovskiy, A. F. (2003). *Integrative control of technique and tactics in alpine skiing: Monograph*. Chaikovsky, Russia: ChGIFK.

Alekseeva, N. D., Filatov, A. O., Ivachev, A. A., & Zinovyev, A. N. (2019). Methodology for selecting special preparatory exercises in teaching alpine skiing techniques to children aged 7–10 in instructor departments. *Uchenye zapiski universiteta imeni P. F. Lesgafta*, (5), 8–12.

Alekseeva, N. D., Davydov, M. V., Ivachev, A. A., & Smirnov, A. S. (2020). Teaching alpine skiing techniques to children aged 4 –8 in instructor services. *Uchenye zapiski universiteta imeni P. F. Lesgafta*, (11), 7–12.

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