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Empowering development through ice and snow sports: challenges and innovative implementation pathways for skiing courses at Beijing universities

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Abstract. Guided by the national initiatives to build China into a leading sporting nation, implement the Healthy China 2030 strategy, and promote ice and snow sports on university campuses, Beijing is well positioned to offer campus skiing courses, benefiting from the legacy of the 2022 Winter Olympics. However, only five universities in the city offer skiing courses on a long-term basis, indicating that participation remains limited. This study examines five universities, including China University of Petroleum-Beijing, and employs literature review, questionnaire surveys, and mathematical and statistical methods to investigate the current implementation of skiing courses, identify factors restricting student participation, examine their educational value in terms of teaching, safety, and student development, and explore the major obstacles to further development. The results show that students' primary motivation for enrolling in skiing courses is their interest in skiing (77%). The main barriers to sustained participation include high costs (63%), insufficient professional instruction (20.5%), and limited safety awareness (16.5%). Most courses are offered as electives through university-resort partnerships, covering both snowboarding and alpine skiing, with an emphasis on practical training on snow. These partnerships help address universities' shortages of ski facilities and qualified instructors, establishing a teaching system centered on practical training and supplemented by theoretical instruction and physical conditioning. Although the courses offer considerable educational value, resource constraints continue to hinder their expansion. To promote sustainable development, this study recommends establishing a dual-track instructor training mechanism, implementing tiered instruction by teams of university and resort instructors, strengthening comprehensive safety management, introducing a tiered cost-sharing system, and expanding channels for disseminating ice and snow culture.

Keywords: skiing courses, universities in Beijing, practical exploration

1. Introduction: research background

Guided by the dual national priorities of building China into a leading sporting nation and implementing the *Healthy China 2030 Planning Outline*, ice and snow sports have become a key driver of the transformation and upgrading of China's sports sector. Relevant documents issued by the State Council emphasize that the high-quality development of the ice and snow industry and the promotion of ice and snow sports on school

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campuses are essential to China's transition from a major sporting nation to a leading sporting nation. As the most widely practiced and popular ice and snow sport, skiing serves as a key vehicle for expanding participation in ice and snow activities and fostering ice and snow culture.

Young people constitute the core target group for the popularization of ice and snow sports, while campus-based ice and snow education is a critical channel for transforming participation from quantitative growth to qualitative improvement [1]. The Ministry of Education and three other government departments have jointly issued special policy documents on bringing ice and snow sports into schools, explicitly calling for the establishment of a comprehensive ice and snow education system for young people and the strengthening of the talent pipeline for these sports. As the primary institutions responsible for cultivating young talent, universities bear important responsibilities for promoting skiing skills, transmitting ice and snow culture, and advancing the integration of sports and education. They are therefore central settings for the implementation of campus-based ice and snow sports programs.

As the host city of the 2022 Winter Olympics, Beijing retains extensive ice and snow sports facilities, well-developed supporting industrial infrastructure, and a strong cultural atmosphere surrounding these sports. The combined advantages of policy support, venue availability, and an established participation base provide the city's universities with distinctive conditions for introducing skiing courses. Nevertheless, a significant gap remains between supply and demand in practice. The resource advantages generated by the Winter Olympics have not been fully translated into tangible outcomes in campus-based ice and snow education. Survey findings indicate that only five universities in Beijing offer skiing courses on a stable, long-term basis, either as compulsory or elective courses, and incorporate them into their regular physical education curricula. The limited coverage and low participation rates of these courses reveal a substantial mismatch between the city's resource advantages and the actual development of university skiing education [2].

A review of the existing literature reveals that most studies focus on macro-level development strategies for campus-based ice and snow sports nationwide [3]. Relatively few empirical investigations have examined skiing courses at universities in Beijing, and quantitative evidence to support course improvement remains insufficient. Against this background, this study investigates universities in Beijing that offer skiing courses. It systematically examines the current implementation of these courses, their educational value, and the factors constraining their development. On this basis, it proposes targeted pathways for sustainable development, addressing the shortage of empirical research on university skiing courses in the region and providing practical insights for universities in other parts of China seeking to introduce ice and snow sports courses.

2. Research subjects and methods

2.1. Research subjects

This study focuses on the development challenges and innovative implementation pathways of skiing courses at universities in Beijing. The survey respondents comprised students enrolled in skiing courses and the instructors teaching these courses at five universities: China University of Petroleum-Beijing, China Women's University, Beihang University, Beijing Sport University, and Capital University of Physical Education and Sports.

2.2. Research methods

2.2.1. Literature review

Relevant journal articles were retrieved from databases such as China National Knowledge Infrastructure (CNKI), Google Scholar, and Web of Science. Searches were conducted using keywords including "ice and

snow sports", "skiing", "campus", "promotion strategies", "universities", and "current development status". Relevant literature on policy support for campus-based ice and snow sports in China, course design, regional differences in implementation, and development challenges was collected and analyzed to gain a deeper understanding of the relevant theoretical foundations. A total of 50 publications were reviewed, of which 15 were cited as references.

2.2.2. Questionnaire survey

Questionnaire surveys were conducted to investigate the implementation of skiing courses at the five universities. The survey process consisted of three stages: questionnaire design, reliability and validity testing, and questionnaire distribution and collection.

2.2.2.1. Questionnaire design

Based on an extensive review of relevant domestic literature [4] and in accordance with the fundamental requirements of questionnaire-based research, two questionnaires were designed to investigate the implementation of skiing courses at the five universities in Beijing: one for students and the other for instructors. The student questionnaire covered several key areas, including course implementation, evaluation of teaching effectiveness, safety and learning experience feedback, perceived course value, and open-ended suggestions. The instructor questionnaire addressed course design and implementation, teaching resources and support, teaching effectiveness and challenges, safety and management, areas for improvement, and open-ended suggestions. These questionnaires were designed to systematically collect information and opinions from instructors regarding various aspects of skiing course provision.

2.2.2.2. Questionnaire reliability and validity testing

The content validity of the questionnaires was assessed through expert evaluation (Table 1). The formal questionnaires were distributed to eight experts in the field of physical education. All experts agreed that the questionnaire content and structure were appropriate. Internal consistency reliability was also examined. Using convenience sampling, 50 questionnaires were distributed to and collected from students at the five universities. Cronbach's alpha was employed to assess the internal consistency of the questionnaire. The results yielded a Cronbach's alpha coefficient of 0.854, indicating a high overall level of reliability and confirming that the questionnaire was suitable for the formal survey.

Table 1. Evaluation of questionnaire content validity ($N = 8$)

Validity	Very Valid	Relatively Valid	Basically Valid	Less Valid	Invalid	Validity Rate
Number of Experts	5	1	2	0	0	100%

2.2.2.3. Questionnaire distribution and collection

Convenience sampling was adopted for this survey. Student questionnaires were distributed online through the Wenjuanxing mini-program to students enrolled in skiing courses at the five universities. A total of 230 questionnaires were collected, of which 30 were deemed invalid. The remaining 200 valid questionnaires yielded an effective response rate of 87%. Five questionnaires were distributed to course instructors, all of which were returned and deemed valid, resulting in an effective response rate of 100%.

2.3. Mathematical and statistical methods

Data analysis was conducted using Excel and other data-processing tools. Survey data collected from the student and instructor questionnaires were statistically processed, and the returned questionnaires were examined and analyzed. In addition, SPSS 26.0 was used to conduct validity tests on the questionnaires to ensure the validity and reliability of the survey data.

3. Results and analysis

3.1. Analysis of students' intrinsic motivations for choosing skiing courses

Table 2. Motivations of students for enrolling in skiing courses

Motivation	Number of Students	Percentage
Interest in skiing	154	77%
Credit requirement	30	15%
Improving physical fitness	6	3%
Social demand	10	5%

The continued provision of skiing courses at universities depends first and foremost on students' willingness to participate and the practical feasibility of their participation. As shown in Table 2, 77% of students chose skiing courses because of their interest in skiing. This finding highlights the central role of personal interest as a driving force behind student participation in skiing. It also indicates that skiing itself has considerable appeal and that university skiing courses have a solid foundation in terms of students' willingness to participate.

3.2. External barriers to student participation in skiing

Table 3. Barriers to student participation in skiing

Barrier Factor	Number of Students	Percentage
High cost of skiing	126	63%
Lack of professional guidance	41	20.5%
Lack of safety awareness	33	16.5%

The transformation of interest into sustained participation is hindered by multiple external barriers. As shown in Table 3, 63% of students identified high costs as the greatest obstacle to skiing independently. The combined expenses of equipment rental, ski resort admission, transportation, and meals are beyond the financial means of many ordinary university students. Another 20.5% reported a lack of professional guidance, expressing concern that learning independently might lead to incorrect techniques and increase the risk of injury. Furthermore, 16.5% had insufficient safety awareness and limited knowledge of rules concerning slope selection and emergency avoidance. These barriers indicate that relying solely on students' independent participation is insufficient to popularize skiing. University skiing courses, by contrast, provide a systematic learning platform characterized by relatively low costs, professional instruction, and an emphasis on safety, thereby helping transform potential interest into actual participation [5].

3.3. Course implementation models and teaching content

3.3.1. Course implementation models

As the host city of the Winter Olympics, Beijing's university skiing course models have considerable demonstration value. Questionnaire surveys conducted among instructors at China University of Petroleum-Beijing, China Women's University, Beihang University, Beijing Sport University, and Capital University of Physical Education and Sports reveal that the university–ski resort partnership model has become the

predominant approach. Its defining characteristics include collaborative resource integration, practice-oriented teaching, and a reasonable distribution of costs. For universities, this model addresses the difficulties of providing skiing courses arising from insufficient facilities and teaching staff by integrating external resources, thereby facilitating reforms in university physical education. For the skiing industry, providing universities with the necessary teaching resources helps establish close connections with student groups. Students can, to some extent, serve as influential advocates for skiing, encouraging more people to participate in the sport while helping businesses attract and develop potential consumers [6]. Although the five universities share certain common features in their approaches to course development, differences also exist. In terms of course status, skiing courses at the universities surveyed are currently offered as electives, with the exception of Beijing Sport University and Capital University of Physical Education and Sports, both of which specialize in sports education. This arrangement may reflect the distinctive requirements of skiing, particularly its dependence on specialized venues and equipment. Offering skiing as an elective helps reduce course development costs to some extent while accommodating the need for a diversified university curriculum.

The survey also reveals differences in cost-sharing arrangements. China University of Petroleum-Beijing, Capital University of Physical Education and Sports, and Beijing Sport University offer skiing courses free of charge to students. China Women's University adopts a cost-sharing arrangement between the university and students, whereas students at Beihang University are responsible for covering the costs themselves.

Table 4. Students' willingness to share the costs of skiing courses

Item	Number of Students	Percentage (%)
Willing to bear part of the skiing course fees	128	64%
Unwilling to bear skiing course fees	72	36%

As shown in Table 4, 64% of students are willing to bear part of the costs of skiing courses. This indicates that students have considerable interest in and expectations for these courses. As long as the fees remain affordable, most students are willing to pay for the opportunity to acquire skiing skills and enjoy the benefits of ice and snow sports. This model not only helps alleviate the financial burden students face when participating in skiing independently but also provides an important reference for universities when planning and developing skiing courses. A balanced cost-sharing arrangement may therefore serve as an effective means of promoting the development of university skiing courses [7].

3.3.2. Teaching content and course structure

The skiing courses offered by the five universities demonstrate a high degree of consistency in their educational objectives. All focus on four key dimensions: developing skiing skills, fostering interest, promoting ice and snow sports, and improving physical fitness. These objectives aim to support students' comprehensive development.

In terms of teaching content, all five universities include both snowboarding and alpine skiing in their curricula, considerably enriching the diversity of course offerings. From the perspective of student needs, this arrangement provides students with a wider range of choices and effectively accommodates their diverse interests and requirements.

Table 5. Allocation of instructional hours in university skiing courses

University	Theoretical Hours	Physical Training Hours	On-snow Practice Hours	Others
China University of Petroleum (Beijing)	2	6	24	0
China Women's University	2	0	30	0
Beihang University	4	8	24	0
Capital University of Physical	2	2	32	0
Beijing Sport University	4	4	28	0

Table 6. Instructional hours required for students to master basic skiing skills

Iterm	Date		
Hours to Master Basic Skiing Skills	11-20	5-10	< 5
Number of Students	44	34	122
Percentage (%)	22%	17%	61%

According to the data in Table 6, 61% of the surveyed students required fewer than five instructional hours to acquire basic skiing skills, while 22% required 10–20 hours and 17% required 5–10 hours. These findings indicate that most students can acquire basic skiing skills within a relatively short period. However, a considerable proportion still require more time [8]. Therefore, sufficient instructional hours should be allocated to on-snow practical training to ensure that students can master the fundamental techniques of skiing.

As shown in Table 5, all five universities allocate the majority of instructional hours to on-snow practical training. This arrangement enables students to acquire basic skiing skills and is consistent with the practical nature of skiing as a sport, in which skill development depends heavily on hands-on practice. Nevertheless, the allocation of hours for theoretical instruction and physical training also warrants careful consideration. The theoretical foundations of skiing should not be underestimated. Skiing theory covers such topics as the principles of sports mechanics, safety and injury prevention, and equipment adjustment and proper use. This knowledge provides the essential foundation for students to advance their skiing skills and maintain safety during subsequent practice [9].

The allocation of instructional hours for physical training is equally important. Skiing places considerable demands on students' physical fitness. Without adequate physical conditioning, students may experience fatigue and deterioration in movement quality during on-snow practice. Such problems not only undermine learning outcomes but may also increase the risk of sports injuries. Accordingly, once sufficient instructional hours have been allocated for students to master basic skiing techniques and meet the course requirements, additional hours should be devoted to theoretical instruction and physical conditioning [10].

3.4. Establishing a comprehensive safety management system

The questionnaire survey revealed that the five universities have adopted a series of rigorous and effective measures to ensure safety in skiing courses. First, eligibility requirements are established at the course enrollment stage. These requirements are clearly stated in the course registration guidelines, which specify that students with pre-existing medical conditions, cardiovascular diseases, respiratory diseases, or physical mobility impairments are not permitted to enroll. This preliminary screening mechanism helps prevent

students who are medically unsuitable from participating in skiing courses, thereby reducing potential safety hazards at the source.

During the first class, instructors ask all students to confirm their physical health conditions once again. This additional step is intended to identify students who may have overlooked important health information because they did not carefully review the enrollment requirements. Through this second confirmation, the universities further strengthen their safety precautions and reduce potential risks.

With regard to class size, each course accommodates between 10 and 20 students to ensure effective supervision and management throughout the teaching process. This arrangement enables instructors to pay sufficient attention to each student's condition. Whether ensuring students' understanding during theoretical instruction or monitoring their movements and the proper use of protective equipment during on-snow practical training, instructors can identify and correct problems in a timely manner. This teaching arrangement considerably reduces the likelihood of accidents.

3.5. The multifaceted educational value of skiing courses

3.5.1. Improving physical fitness through skiing courses

Table 7. Improvement in students' physical fitness test scores

Physical Fitness Test Result	Number of Students	Percentage
Improved	167	83.5%
No Change	33	16.5%

The survey results (Table 7) show that 83.5% of students believed their physical fitness test scores had improved after participating in skiing courses. This finding clearly demonstrates the positive effects of skiing courses on students' physical fitness. By appropriately balancing physical training with on-snow practical sessions, the courses promote improvements across multiple dimensions of physical fitness. Specialized physical training sessions strengthen the key muscle groups required for skiing. During on-snow practice, students repeatedly perform movements such as gliding, turning, and braking. Through these exercises, they not only acquire skiing skills but also develop muscle strength, endurance, and coordination [11].

3.5.2. Developing safety awareness

Table 8. Improvements in students' safety awareness and emergency response skills through skiing courses

	Very Poor	Poor	Fair	Good	Very Good
Improvement effect of the course on skiing safety awareness	0%	6.5%	30.5%	30.5%	32.5%
Improvement effect of the course on emergency handling ability	0%	8.5%	35%	32.5%	24%

According to the questionnaire results, skiing courses play a significant role in improving students' safety awareness. As shown in Table 8, 32.5% of students rated the courses' effectiveness in improving safety awareness as very good, while 30.5% rated it as good. Combined, 63% of students gave positive evaluations of the courses' contribution to safety awareness. Regarding improvements in emergency response skills, 24% of students rated the courses' effectiveness as very good, and 32.5% rated it as good. These findings indicate that the courses have achieved certain results in strengthening students' emergency response capabilities. The data provide strong evidence that theoretical instruction, practical guidance, and safety drills effectively enhance students' understanding of skiing-related risks and their ability to respond to potential emergencies [6].

3.5.3. Promoting individual development and social dissemination

Table 9. Influence of skiing courses on students' behavioral intentions

	Significantly Decreased	Slightly Decreased	No Change	Slightly Increased	Significantly Increased
Increase degree of the frequency of independent participation in skiing	4.5%	8.5%	30.5%	37%	19.5%
Likelihood of recommending skiing to relatives and friends	0%	2%	31%	34.5%	32.5%

As an emerging component of university physical education, skiing courses offer value that extends beyond individual student development. They also serve an important social function in popularizing skiing and disseminating ice and snow culture.

The courses systematically introduce students to the history of skiing, knowledge about the Winter Olympics, and regional ice and snow cultures. These topics deepen students' understanding of and identification with skiing while stimulating their interest in the sport. The survey results (Table 9) show that 56.5% of students reported varying degrees of increase in the frequency of their independent participation in skiing after completing the courses. This finding demonstrates that the courses effectively stimulate students' interest in skiing and help translate that interest into sustained participation in the sport. Furthermore, 67% of students indicated that they were likely or very likely to recommend skiing to their family members and friends. The positive experiences and cultural identification developed through the courses encourage students to recommend skiing to people around them, thereby attracting more participants and jointly promoting the dissemination and popularization of ice and snow sports [8].

4. Challenges in the implementation of skiing courses

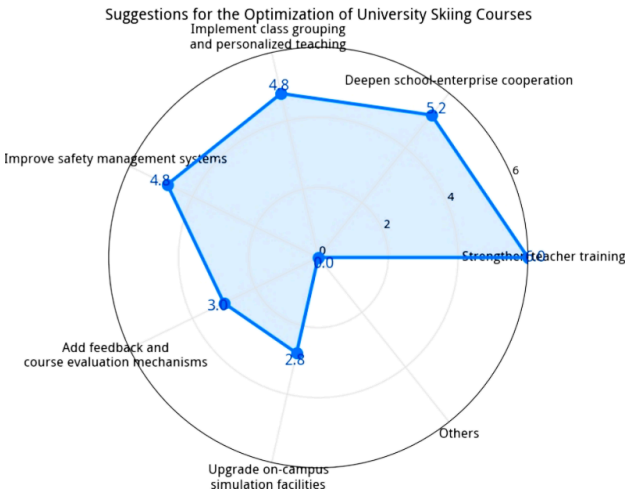


Figure 1. Composite scores of priority areas for course improvement

As an emerging component of university physical education, skiing courses play an important role in promoting campus-based ice and snow sports and improving students' physical fitness. However, their

implementation and development currently face numerous challenges that require further investigation and resolution.

4.1. Imbalance between the supply and demand of skiing instructors

As shown in Figure 1, strengthening instructor training receives a relatively high composite score among the various improvement indicators, highlighting the serious challenges facing the development of teaching staff for university skiing courses. The severe shortage of qualified skiing instructors makes it difficult for universities to expand course offerings in response to student enrollment demand, thereby preventing them from fully meeting students' needs for acquiring skiing knowledge and skills.

4.2. Challenges in differentiated instruction and feedback mechanisms

Course grouping and personalized instruction present considerable challenges in the organization and implementation of teaching (Figure 1). Given the substantial differences in students' existing skiing abilities, establishing appropriate class groupings is difficult. Consequently, instructors face challenges in tailoring instruction to individual needs, fully developing each student's potential, and maximizing teaching effectiveness. Meanwhile, significant deficiencies remain in the mechanisms for evaluating and providing feedback on teaching effectiveness. These shortcomings indicate a lack of effective feedback channels during the teaching process, making it difficult to identify instructional problems promptly and implement corresponding improvements.

4.3. Challenges in establishing a comprehensive risk prevention and control system

Table 10. Incidence of injuries during skiing courses ($N = 200$)

Injury status in the course	Number	Number
Injured	69	34.5%
Uninjured	131	65.5%

Table 11. Causes of injuries among students who sustained injuries ($N = 69$)

Injury Factors	Number	Number
Non-standard movements	52	75.36%
Inadequate protective gear and other protective measures	6	8.69%
Insufficient post-class relaxation activities	11	15.94%

Skiing is a high-risk sport characterized by considerable speed, instability, and uncontrollable environmental factors. Within the university physical education curriculum, its risk level is considerably higher than that of traditional ball games or track and field events. Students who lack a solid technical foundation, proper knowledge of protective equipment, and adequate warm-up and recovery routines are highly susceptible to sports injuries, which may also have more serious consequences. The inherently high-risk nature of skiing therefore places exceptionally demanding requirements on course safety management and risk prevention and control. The survey results confirm these concerns. As shown in Table 10, among the 200 students surveyed, 69 (34.5%) had sustained injuries of varying severity during skiing courses. This injury rate of nearly one-third is considerably higher than that associated with most conventional physical education courses, directly reflecting the actual risks involved in skiing instruction.

A further analysis of the causes of injuries (Table 11) reveals that 75.36% resulted from improper skiing techniques, indicating clear deficiencies in the precision of technical instruction and the timeliness of corrective guidance. Another 15.94% of injuries were attributed to insufficient post-class stretching and relaxation, which led to muscle strain or delayed-onset muscle soreness. This suggests that post-exercise recovery has not received adequate attention. The remaining 8.69% resulted from inadequate protective equipment and other safety measures, exposing weaknesses in equipment quality control and the enforcement of proper equipment-use standards.

These findings demonstrate that the existing risk prevention and control system has not yet adequately addressed the high-risk nature of skiing. Frequent injury incidents not only directly undermine students' physical health and increase their physical discomfort and medical expenses but also seriously weaken their sense of psychological safety and sustained interest in skiing. Consequently, such incidents may damage the reputation of skiing courses and reduce their attractiveness to prospective students.

4.4. Resource constraints arising from venue dependence and funding limitations

Most universities rely on off-campus ski resorts to conduct their skiing courses. This arrangement not only increases teaching costs but also considerably complicates course organization, creating numerous practical difficulties for the smooth implementation of teaching activities. Limited financial investment further constrains the renewal and expansion of teaching resources, preventing universities from providing students with higher-quality facilities, more diverse instructional resources, and richer learning experiences. These resource constraints seriously hinder the high-quality development of university skiing courses.

5. Conclusion and recommendation

5.1. Conclusion

(1) Skiing courses at universities in Beijing primarily adopt the university–ski resort partnership model. By integrating off-campus venue resources and professional instructors, this model effectively addresses the difficulties universities face in offering skiing courses due to insufficient on-campus facilities and a shortage of qualified teaching staff.

(2) Skiing courses are primarily offered as electives and cover both snowboarding and alpine skiing. Most instructional hours are allocated to on-snow practical training, while theoretical instruction and physical conditioning are also incorporated, forming a teaching structure characterized by practice-oriented instruction supplemented by theory and physical training. Meanwhile, through health screening, small-class instruction (10–20 students), and safety education, these courses have significantly improved students' physical fitness, awareness of skiing-related risks, and emergency response capabilities.

(3) In terms of ice and snow culture dissemination, the courses deepen students' understanding of skiing through systematic instruction in ice and snow culture. They effectively encourage students to move from interest-driven participation toward sustained engagement in skiing and motivate them to introduce the sport to their family members and friends, thereby establishing a dissemination chain from students to their social networks.

(4) Although skiing courses have been introduced into the physical education systems of universities in Beijing, their development remains constrained by multiple factors, including instructor shortages, difficulties in implementing differentiated instruction, inadequacies in course risk prevention and control systems, and insufficient funding. Systematic improvements are therefore urgently needed to promote their sustainable development.

5.2. Recommendation

5.2.1. Establishing a dual-track instructor development model for students and teachers

A dual-track instructor development model involving both students and teachers can be established to strengthen the teaching workforce for university skiing courses. Physical education instructors who are interested in skiing can be selected to participate in skiing courses as teaching assistants. They should be involved throughout the learning process, acquiring fundamental skiing techniques while assisting the lead instructors in supervising students and maintaining safety. This model can not only help address the shortage of professional instructors but also strengthen safety supervision and teaching management. It is particularly suitable for universities seeking to develop their teaching workforce during the initial stages of promoting skiing courses.

5.2.2. Implementing a collaborative two-instructor model for differentiated teaching

To address the challenges of differentiated instruction, a collaborative two-instructor teaching model can be adopted. Under this arrangement, two instructors are assigned to each skiing course and take responsibility for teaching students at different skill levels. One instructor focuses on beginners and students with limited skiing experience, while the other provides instruction for students who already possess a certain level of skiing proficiency. This arrangement accommodates the learning needs of students with different skill levels and supports their respective development.

5.2.3. Establishing a dual safety monitoring mechanism before class and systematic stretching and relaxation after class

Before each class, instructors should inspect the quality and condition of protective equipment and check whether students are wearing it correctly to prevent injuries caused by defective equipment or improper use. After physical activity, instructors should organize at least 15 minutes of systematic stretching and relaxation exercises. Dynamic stretching routines should be designed to target the muscle groups subjected to heavy loads during skiing. These exercises can promote lactate metabolism, relieve muscle fatigue, and reduce the risk of sports injuries and delayed-onset muscle soreness.

5.2.4. Introducing a tiered cost-sharing model and expanding channels for ice and snow culture dissemination

A tiered cost-sharing arrangement combining university subsidies with moderate student contributions should be introduced. Universities should cover essential teaching expenses, including basic ski resort instruction fees, professional safety equipment, and public transportation. Students should only contribute a small portion toward additional expenses, such as ski passes and personal consumables. For students from financially disadvantaged backgrounds, universities should simultaneously provide access to special sports subsidies and extracurricular activity grants to waive their individual contributions, thereby balancing institutional cost control with equitable student participation.

This cost-sharing model can effectively alleviate the financial pressure associated with universities covering all course expenses, lower the financial barriers to offering skiing courses, and enable more institutions to gradually introduce skiing electives. Furthermore, moderate student contributions may help identify groups of students who have a strong interest in ice and snow sports and are willing to invest their time and energy in learning. Such students are more likely to take the initiative to explore the history of ice and snow sports, Winter Olympic culture, and skiing-related knowledge. They are also more inclined to participate in ice and snow activities independently after class and share their skiing experiences with classmates, friends, and family members. By engaging these interest-driven students as key participants in disseminating ice and snow culture, universities can encourage them to organize informal activities, such as

knowledge-sharing sessions and skiing experience exchanges, through classes, student associations, and campus social networks. This approach can establish a dissemination pathway characterized by in-depth engagement within smaller groups followed by expansion across interconnected social circles. In this way, the reach of campus-based ice and snow sports can be steadily expanded, while the educational role of skiing courses in popularizing ice and snow culture can be sustained.

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References

[1] Su, X., & Mei, C. (2025). A survey of sports injuries among university students participating in skiing. *Jilin Medical Journal, 46*(3), 675–677.

[2] Wang, P., Wang, J., & Cai, Y. (2025). Spatial differentiation patterns and driving factors of ski resorts in China from a multi-scale perspective. *Arid Land Geography*, 1–11. http://kns.cnki.net/kcms/detail/65.1103.X.20250208.1300.002.html

[3] Quan, H., & Wang, X. (2024). The current state, practical dilemmas, and pathways for the development of ice and snow sports in China under the background of building a leading sports nation. *Journal of Harbin Sport University, 42*(5), 33–39.

[4] Zhao, J., & Li, Z. (2024). Research on the development of ice and snow sports in China under the background of building a leading sports nation. *Journal of Chengdu Sport University, 50*(4), 88–94. https://doi.org/10.15942/j.jcsu.2024.04.011

[5] Ma, D., Hu, P., & Hu, J. (2024). Research on the innovation of talent cultivation models for ice and snow sports in universities under the integration of industry, academia, and research. *Heilongjiang Researches on Higher Education, 42*(5), 19–26. https://doi.org/10.19903/j.cnki.cn23-1074/g.2024.05.006

[6] Chen, H. (2022). Mechanisms and optimization strategies for promoting ice and snow sports in schools. *Sports Culture Guide*, (4), 22–28.

[7] Wang, B. (2021). The value and pathways of promoting ice and snow sports in schools from the perspective of the integration of sports and education. *Sports Culture Guide*, (4), 92–98.

[8] Yang, S., & Liu, B. (2021). The intrinsic relationship between promoting ice and snow sports in schools and the integration of sports and education: Research and lessons from experience. *Journal of Beijing Sport University*, *44*(3), 105–113. https://doi.org/10.19582/j.cnki.11-3785/g8.2021.03.010

[9] Quan, H., & Guo, Z. (2020). The mechanisms, dilemmas, and pathways of promoting ice and snow sports in schools through school-enterprise cooperation. *Journal of Shenyang Sport University*, *39*(5), 24–31, 48.

[10] Li, X., Chai, J., Li, X., & Wang, X. (2020). Research on the integration of ice and snow sports into universities in China. *Sports Culture Guide*, (7), 14–20.

[11] Cui, C. (2019). An analysis of the relationships among interest in university physical education classes, satisfaction with instruction, and awareness of sustained participation in sports. *Sports World (Academic Edition)*, (6), 146–147. https://doi.org/10.16730/j.cnki.61-1019/g8.2019.06.085