



3rd Scientific Conference
SPE BALKAN SKI
Science, Practice & Education

THE BOOK OF ABSTRACTS



ROGLA, 2020

Ski Instructors Association of Slovenia (SITAS) &
Science and Research Centre Koper (SRC), Slovenia



3rd Scientific Conference
SPE BALKAN SKI
Science, Practice & Education
(Rogla, 2020)

The Book of Abstracts



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The Book of Abstracts

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PLENARY SPEAKERS

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University of Stuttgart, Institute of Sport, Stuttgart, Germany

Sigmund Loland

Norwegian School of Sport Sciences

Erich Müller

Department of Sport Science, University of Salzburg, Austria

SNOWSPORT AS A PERFORMANCE ENHANCER IN EXECUTIVE FUNCTIONS

Dieter Bubeck, Frieder Beck, Dominique Rau

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Abstract

The ability to selectively control the own mental activity, the mindfulness, the behavior and the own emotions is an important basis for the success in school and in life. A lot of studies show that success in school is direct dependent on physical fitness. If we can concentrate on one thing, can keep ideas in mind, can resist short time temptations and are able to constrain impulsive behavior the so called “Executive Functions” are in a well shape. Moffit et al. (2011) showed that childhood self-control predicts physical health, substance dependence, personal finances and criminal offending outcomes, following a gradient of self-control. Effects of children’s self-control could be disentangled from their intelligence and social class as well as from mistakes they made as adolescents. But how to develop the executive functions? Kubesch et al. (2011) concluded that executive functions of children and youth profit from an enhanced physical fitness and from acute physical activity. So, it can be shown that dopamine is an important factor in the development of new synapses and therefore new pathways and connections in the central nervous system. High amounts in the release of dopamine can be observed if a physical and motoric challenging action is realized better than expected. The higher dopamine level enhances the value of binding of synapses which is associated with a learning process. Additionally, physical activity especially endurance type activity leads to the release of so-called brain derived neurotrophic factor (BDNF) which can be seen as a kind of fertilizer for synaptic bindings. So physical activity, executed in a special way leads to these effects. A perfect setting is outdoors sports such as skiing in nature. Here often the actual situation changes and a lot of challenging and motivating situations occur. This leads to the special effects in the release of dopamine and BDNF. So, if these situations would be combined with special neuronal challenging exercises it can induce an enhancement of executive functions. A study we will present with young skiers demonstrates the positive effects of skiing with challenging tasks on the improvement of

the executive functions. To conclude we want to show that skiing with special tasks will be very effective in the development of executive functions and represents an important contribution for their success in school and professional career.

RESEARCH ON SKIING: TWO PARADIGMATIC APPROACHES

Sigmund Loland

Norwegian School of Sport Sciences

Abstract

The aim of skiing research is to develop relevant knowledge of skiing in width and depth. I suggest applying two paradigmatic approaches to reach this aim. A first approach departs from phenomenology: analyses of core experiential structures of the phenomenon under study. I exemplify with an analysis of alpine skiing in terms of a holistic model with technical elements such as balancing, finding support on the surface, gliding, and rhythm. A phenomenological approach operates close to skiing practice and opens for pedagogical and didactic insights. A second paradigmatic approach builds on the ideals of natural science with emphasis on quantifiable data, and a search for causal relationships and predictive force. I exemplify with mechanistic analyses of technical elements in alpine skiing. Typically, a natural science approach includes perspectives from physiology, biology, and mechanics. In a final section, I argue that the two paradigmatic approaches complement each other. Together, they can provide relevance, width and depth to skiing research. I conclude by speculating on potential merging of paradigms in future studies of human movement technique.

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BIOMECHANICS AND INJURY PREVENTION OF ELITE AND YOUTH ALPINE SKI RACERS

Erich Müller

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Abstract

Alpine ski racing is known to be a sport with a high risk of injury. Injury rates of more than 36 injuries / 100 athletes per season have been reported, 36% being severe and partly career ending. Ligament injuries in the knee were the most common injuries (36%) in World Cup athletes. Other frequently injured body parts were the lower back (low back pain), sacrum, shoulder and the head. All disciplines were found to be equally dangerous if the effective exposure time was considered.

Athlete-related risk factors are reported to be a) fatigue within a course or training session, b) inappropriate tactical choices, c) insufficient physical fitness, and d) technical mistakes. With respect to physical fitness, insufficient core strength or core strength imbalances, deficits in neuromuscular control, high asymmetries in unilateral leg extension strength, and hamstring / quadriceps strength deficits seem to be the main risk factors in elite ski racers. But considering the very short period of time during which ACL injuries occur, it is not only a question of the strength of the hamstrings and quadriceps, but also a question of the timing of the co-activation of these muscles (feed forward coordination).

INVITED SPEAKERS

Ronald W. Kipp

*Squaw Valley | Alpine Meadows Ski Team
Olympic Valley, California, USA*

Andrej Miklavc

Winter Sport Expert Group

Lana Ružić

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LONG TERM ATHLETE DEVELOPMENT: ALPINE SKI RACING TECHNIQUE CONSIDERATIONS

Ronald W. Kipp

*Squaw Valley | Alpine Meadows Ski Team
Olympic Valley, California, USA*

Abstract

Athlete development is a biological and psychological growth phenomenon. Today we know, to achieve the highest levels of sport, training needs to follow a planned, systematic, and progressive menu. Understanding and adhering to physiological and psychological benchmarks allows growth to be optimized.

Unfortunately, athletes and coaches push the optimal developmental pace chasing the dream. When athlete achievement is pushed in a “more is better” accelerated attitude, the momentary satisfying results end up stagnating the athlete’s long term development. Missed developmental reference points that were bypassed in pursuit of transitory fame undermine the athlete’s foundation limiting ultimate growth. Without this initial and essential groundwork, the eventual level of achievement will be limited.

Long term athlete development (LTAD) has roots that can be traced to the initial philosophy of “periodization”. Periodization, as the name implies, dealt with the time domain. Utilizing timing to optimize training cycles it was found that rest, stress, and type of exercise could be altered to reach even greater levels of athletic achievement.

While periodization was developed around time periods for exercise and sport improvement, LTAD uses time to emphasize the developmental pace or phase of the athlete. In this vein, chronological age is less significant than biological and training age. In other words, the maturity of the athlete’s development is foremost.

Today LTAD is the preeminent model, focusing on developmental level rather than just development. This focus on maturity stresses building a skill base rather than just mimicking a World Cup athlete. If a first grade math teacher tried to teach calculus to her students, the outcome would be total confusion. Obviously the prerequisites of learning to count, add,

multiply, algebra, geometry, etc. are crucial. And without the order in which they are presented, they could never actually be learned.

One of the many examples is a carved turn on a World Cup injected race piste. For the young athlete this is not the arena to learn, nor the skill level to attempt. We need to adjust the environment and the skill in progressive steps for the athlete's developmental age. World Cup racers are able to balance against a miniscule amount of ski edge on solid ice while making a carved turn. Meanwhile the aspiring U10 athlete learning the same skill is better progressed with a larger base-of-support found in much softer snow and with less edge angle.

ROLE AND CHALLENGES OF ENGAGING KIDS IN SKIING

Andrej Miklavc

Winter Sport Expert Group

Abstract

To have a sustainable development of skiing in the future, we need to understand the importance of all stakeholders involved in winter sport, especially in skiing.

Skiing is an experience and experience is created by people at first and at most. We all know, if you enjoy and start loving skiing at your young age it is more likely you will continue skiing throughout your all life. And that is our common goal, right. Why children/youth segment needs a special attention on what/how/why, ski teachers, ski coaches and parents play the most important role in this segment of skiing?

Learn simple facts and receive “easy to use” toolbox for ski community, to become more efficient and successful by addressing and working in children/youth segment in ski sport.

THE RISE OF SKI HELMETS: WHAT HAVE WE LEARNED IN LAST FEW DECADES?

Lana Ružić

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Zagreb, Croatia*

Abstract

Looking at the ski slope footage from thirty years ago, the difference that one observes is the head protection garment e.g. ski helmet. The part of the equipment which was basically unknown till the last few decades, became almost unavoidable. The prevalence of skiers using ski helmets rose from less than 5% in 1990 to around 50% in 2000, and is currently pushing high 80-90%, depending on region. The estimated number of active skiers in the world is 115 million, and with recommendations that a helmet should be replaced every 5 years (no matter the amount of impacts), the potential of the market is huge. The chance of dying while skiing is estimated to be 1 in 1.4 million but despite that the majority of skiers would consider a helmet primary as a lifesaving garment. Nevertheless, there are many other benefits of helmet, maybe even as simple as its warmth. Of course, it protects from some forms of head injuries and it seems to protect from concussions. There is very little doubt left whether the helmets are useful overall, but still the biggest concerns of scientists address three to four major problems;

The first one was raised, among others, by ski patrols who reported impairment of hearing and sight. Several studies eventually concluded that vision should not be a problem, whilst there is still some doubt whether helmets reduce the environmental sounds, especially the sounds of danger and distort the sound localization and especially with music (Ruzic, 2015).

The next concern was so called "risk taking theory". It was proven before that when a person holds to somewhat as to the "lifesaving cushion" he compensates in behavior for this additional sense of security. This might be a reason that even though the number of helmet users increased dramatically, the overall skiing mortality did not follow the same pattern. This issue is still being debated (Ruedl, 2015).

Studies dealt also with transfer of impact forces from head to neck and spine during helmeted falls and few researchers did not prove higher chance for neck injury. Unfortunately, recently, the new suspicions emerged as two studies agreed that helmet wearers suffered less bone skull fractures, but they suffered more complicated bleeding injuries, intracranial hemorrhages, neck injuries, and they were more likely to fall from a jump or hit a tree (Porter, 2019). So, the old questions emerged again. Does that all bring us back to risk taking theory, to helmet/head combined weight problems, to speed/impact force related helmet limitations and basically to need for more research?

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**DOPING, SUBSTANCE MISUSE AND DIETARY
SUPPLEMENTATION IN SKIING.**

**SHOULD WE WORRY ABOUT IT, AND (IF YES),
WHY?**

Damir Sekulić

University of Split, Faculty of Kinesiology

Abstract

Doping is a known issue in competitive sport, and academicians and professionals are deeply involved in finding the most appropriate and effective ways of dealing with it. Surprisingly, alpine skiing is not studied regarding this problem. Meanwhile, there is a growing interest about (other) type of substance misuse in sports (i.e. smoking, alcohol, illicit drugs), but alpine skiing society is not involved in such trends although there is a large body of evidence that certain types of substances are an inseparable part of alpine-skiing culture. Finally, the consumption of dietary supplements is more often than not a usual practice in competitive sport, but skiing is again understudied in this context. In this lecture, the issues of doping, substance misuse, and dietary supplementation are discussed from the perspective of evidence-based approach which will hopefully contribute to assuring the healthy and low-risk environment in alpine skiing. Experiences from other sports and sport-societies are translated into the specific alpine-skiing environment while trying to highlight specific risks and threats that encompass the possible ignorance of this problem.

Doping is a well-known problem in competitive sport and academics and professionals are heavily involved in finding the most appropriate and effective ways to deal with it. Surprisingly, alpine skiing is not examined for this problem. Meanwhile, there is a growing interest in (other) types of drug abuse in sport (i.e. smoking, alcohol, illicit drugs), but the Alpine skiing community is not involved in such trends, although there is a lot of evidence that certain types of substances are an integral part of Alpine skiing culture. Finally, the intake of dietary supplements in competitive sports is more than usual, but skiing is again undervalued in this context. In this lecture, the issues of doping, substance misuse, and dietary supplementation are discussed from the perspective of an evidence-

based approach which hopefully will contribute to the healthy and low-risk environment in alpine skiing. Experiences from other sports and sport-communities are translated into the specific alpine-skiing environment while trying to highlight specific risks and threats that encompass the possible ignorance of this problem.

CHALLENGES IN THE TALENT DEVELOPMENT OF YOUTH ALPINE SKI RACING

Lisa Steidl Müller

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Abstract

Alpine ski racing is one of the most popular winter sports in many countries all over the world. Thousands of children specialize at an early age with hopes of becoming professional and successful athletes. The peak performance in alpine ski racing, which is considered as a complex sport and characterized by high physical and tactical capacities, is mostly achieved between the ages of 26-28 years. When implementing strategies to develop talent in an early specialization sport like alpine ski racing, the specialization at an early age combined with a relatively long competitive life needs to be considered. However, the number of those children specializing at an early age has decreased during the last years, and simultaneously, the number of youth ski racers who have dropped out of the sport as a result of their lack of success or due to selection disadvantages, respectively, has increased. Additionally, training loss due to severe injuries represents an additional challenge during the development process. However, the mechanisms behind the loss of talent are not that clear.

The relative age and the biological maturity status of youth ski racers seem to strongly influence the likelihood of selection during the talent development process. Athletes who are born late in the selection year seem to only have a chance for selection during the talent development process, if they are early maturing. Thus, relatively younger and late maturing athletes seem to be discriminated against, which leads to a selection error in the development of youth ski racers. The biological maturity status additionally represents a significant injury risk factor in youth ski racing; late maturing athletes are at a higher risk of sustaining severe injuries. Apart from that, core strength, neuromuscular control, leg dominances in leg extension strength, and anthropometric characteristics represent significant injury risk factors. Talent development processes should consider the relative age and the biological maturity status of the athletes. Athletic training sessions of

youth athletes should focus on core strength and neuromuscular control contents, and additionally, the biological maturity status should be considered as well, in order to prevent late maturing athletes from sustaining overuse and traumatic injuries.

MONITORING ALPINE SKIING PERFORMANCE USING WEARABLE TECHNOLOGIES

Matej Supej

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Abstract

Alpine skiing has been an Olympic sport since the first Winter Games in 1936 in Garmisch-Partenkirchen, Germany. After several years of top-level ski racing, it has led to skiers being able to constantly adapt themselves technically and tactically to snow conditions, gate setups, weather conditions and equipment. But progress at such a high level needs a reliable assessment of performance of alpine skiers. Previous research led to conclusions that wearable technology represents the edge in order to be able to obtain 3D kinematics of the entire course, unlike camera-based systems that allow only a very limited part of the course to be analyzed. Such wearable systems nowadays, with the help of biomechanical modeling and/or artificial intelligence, already enable gate-to-gate timing and analysis of trajectories, speeds, energy losses, to some extent resistance and friction during skiing, skiing techniques, etc. Furthermore, to assist skiers and coaches reaching top performance, vibrations are also measured by accelerometers and the ground reaction forces with special force sensors, pressure insoles, and are sometimes also estimated through kinematic measurements. From a practical point of view, a number of performance-related parameters need to be considered to effectively evaluate performance and these parameters are advantageous to be synchronized with video for comprehensive analysis. Advances in technology already today allow, to a certain extent, accurate biomechanical real-time analysis of performance over the entire ski course. In the future, however, a new kind of patch-like sensors can be expected, e.g. SINTECs that will be practically "invisible" and capable of simultaneously capturing both biomechanical and physiological parameters in conjunction with advanced software that will further facilitate data analysis.

SCIENTIFIC AND PROFESSIONAL CONTRIBUTIONS

TEACH DIFFERENT – SO FARE, SO CLOSE

Yuri Boscheri, Fabio Fenili

S.I.A.S. – Ski Instructor Association San Marino, Demo team San Marino, San Marino

Abstract

The concept of Teach Different starts from an in-dept study of theories of the Communication, with particular reference to two authors, Albert Mehrabin, American psychologist which placed in the center the conditioning of the non-verbal cues has on the effectiveness of the communicative act, and Paul Watzlawick, psychologist and philosopher from Austria and his 5 axioms of the human's Communication.

These authors teach us that in one interpersonal relationship, saying things it's not enough (e.g. to say to the pupil "you can do it") but it's necessary to instill in the pupil the self-confidence, self-esteem, conviction of succeed in something, motivation etc. In this content come into play in a decisive way the non-verbal aspects of Communication that influence or sometimes change the significance that the pupil gives to the instructor's words. Among the more conditioning factors are:

- The existing relationship between Instructor and Pupil;
- The physical distance between Instructor and Pupil;
- The paraverbal communication (use of voice)
- The non-verbal communication (body language/gestures and facial mimic)

The ski instructor often needs to manage the lesson in difficult conditions from this point view (distances, noises, distractions, fears) and in this content exists some aspects that could be demotivating for the pupil (e.g. waiting time) and difficult to manage for the ski instructor (e.g.: use of voice).

So, the Ski Instructor, in addition to have an appropriate work environment, needs to have the opportunity to use technology systems to help him work, such as WS2 of Whispersport®. It's a comfortable and versatile transceiver radios that, following the concept "So Far So Close",

enable to the Ski Instructor to have always contact pupils or “close to him”. The main advantages of WS2 use during the lessons are:

- TIMES optimizing, (we can provide technic feedbacks with the group also on the chairlifts);
- INSTANT FEEDBACK during the ride, -highly effective from the technical-didactical point of view;
- Increase of SAFETY because Instructor give commands and instruction to the public also from the distance;
- Possibility to manage the VOICE effectively and strategically, (to give attention to the paraverbal aspects of Communication).

During the LECTURE these concepts will be implemented in depth by the Demo Team San Marino’s members with the assistance of audiovisual material, lecture and slides. During the WORKSHOP on the slope, every participant will have the opportunity to try the benefits of a presented approach. The presenter will divide the participants in sub-groups in a way that everybody will try the WS2 of Whispersport ® from the Instructor’s and pupil’s point of view.

DOES THE SEQUENTIAL TEACHING OF ELEMENTS OF ALPINE SKI SCHOOL FOLLOW THE INCREASE OF FORCE BENEATH THE SKIER'S FOOT?

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Abstract

To find an optimal balance position by using feet, ski shoes and skies on a snow surface, it is essential to harmonize the pressure that a skier produces during a turn as well as ground reaction forces. In order to control the forces during the turn, skier needs to position the skies at a specific angle (edging angle), press them on the snow surface and rotate them. In everyday practice, it is quite common for a ski instructor to ask participants of a ski school to feel pressure under certain parts of the feet during skiing in order to improve their performance. At the same time literature is lacking concerning ground reaction forces and pressures achieved during recreational level skiing. The aim of the present study was to determine the differences between measured forces and their distribution under skiers' feet during performance of different elements of ski technique. Analysis of kinetic parameters was conducted on four elements of alpine ski school (snowplough, basic turn, parallel turn, short turn). Variable sample included maximal force, medial force, lateral force and force on the heel of inner and outer leg in each turn. In each element of ski technique analyzed were 12 turns (6 in left and 6 in right side). Kinetic parameters were measured by insoles designed for pressure detection. Results of this study suggest that in-boot pressure over outer leg rises as the turns become more complex (from snowplough to short turn). When pressure is compared between inner and outer leg, significantly lower pressure level was on an inner leg (in ratio 1:4) in all elements of technique except during short turn. From a ski technique standpoint, it was clear that the pressure applied with the feet was higher towards more complex elements, and this finding is in accordance with advancements of plan and program of an alpine ski school. Therefore, it is necessary for ski instructors to teach skiing

beginners where, when and how to apply pressure in each phase of learning process.

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ADOPTION OF ALPINE SKIING TECHNICAL ELEMENTS IN CHILDREN AGED 4-11 YEARS: SEX DIFERENCES

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Abstract

Previous research showed that different methods and principles for assessing the adoption of skiing technique have been used. This is very specific because of the age of the participants, the number of days on the snow, the climate of the location where the research has been conducted and the use of information technology. It should be noted that there is no standardization that could apply to children, especially of pre-school age. The aim of this research was to determine the adoption of the basic technical elements of alpine skiing in pre-school and younger school children and to determine the differences between sexes. The sample consisted of 226 participants, out of which 105 (46.5%) boys and 121 (53.5%) girls. They were divided into two age groups, first consisted of pre-school children aged 4 to 7 years (age: 5.50 ± 0.92 years), and second consisted of children of younger school age, from 7 to 11 years. A three-stage assessment scale with three levels was used to test the quality of alpine skiing technique: "yes", "partially", and "no". Based on each question, an insight into the state of adoption of the alpine skiing technique was obtained. Results shows there is no significant difference ($p > 0.05$) between boys and girls of pre-school age in the adoption of alpine skiing technique. In younger school children, variable related to balance, showed difference ($p = 0.03$) between boys and girls with the value of hi square test of $\chi^2 = 7.18$. The importance of the research is in monitoring the success of adopting the basic technique of skiing in children who are beginner skiers.

By identifying and analyzing the various parameters of technique adoption in children, it is possible to systematically monitor the relevant variables of the performance of the rational technique, from the very beginning of the training at each stage of improving the technique of skiing.

FINDINGS OF INNOVATIVE PROFILING OF THE ALPINE SKI

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Abstract

Two of the more prominent recent changes in modern recreational and professional skiing are the skiing speed and the desire to perform turns in a more effective way. The classic design of alpine skis does not meet these requirements sufficiently, since the skis are not drifting (sliding) in an optimal way. This leads to the lack of control, disruptive vibrations, bad traction, uncontrolled slipping, significant speed fluctuations throughout the turn, longer line, worse dynamic balance, etc.

Two key characteristics of the patented ski profile:

- The skis have a more prominent trapezoid shape,
- the side of the ski has a concave curve which varies according to the type of the skier (child, recreational skier, professional skier), the discipline and the snow surface.

The range of advantages in professional skiing is multifaceted:

- Physical component: less vibrations, better traction, undisrupted inclination of the ski, higher speed, lower friction, directional stability, better navigability, etc.
- Technical component: new type of ski turns, more aggressive line, starting to perform turns earlier and smoother, correcting in a more effective way, steering with better control, quicker transitions between individual turns, binding of turns in a more fluid and dynamic way, more effective regulation of weighting, etc.
- Tactical component: skiing in a more aggressive manner, creating and performing faster lines, reduction of time pressure, faster corrections of technical elements, optimization of skiing dynamics, etc.

- Psychological component: improved self-confidence, higher level of concentration, better motivation, greater level of calmness, overwhelming sense of enjoyment and striving for excellency, etc.

In practice, more than 150 pairs of skis for children, recreational skiers and professional world cup skiers were “processed”. Due to the more reliable and easier performance of turns, the trust in the skis by children and adult beginners was built significantly sooner, the control of the skis and, above all, identifying the level of traction and the undisrupted steering and inclination of the skis, were improved. All this resulted in a smoother, calmer and a more stable way of skiing.

Recreational skiers very quickly recognised and adopted the advantages of this patent. This was reflected in a tendency to ski in a more efficient manner, in a greater level of satisfaction and enjoyment, as well as in the will to upgrade the existing knowledge. They emphasized easier performance of turns, easier and more effective decision-making during the performance of turns, the calmness of the skis on different surfaces, and, above all, better traction which leads to improved anticipation and greater trust in the skis.

On the other hand, the more advanced recreational skiers embraced the challenge of reaching the expert level of skiing with the help of instructors. They recognized the entirely new dimensions of steering, traction and, above all, creation of efficient lines of skiing while experiencing a higher degree of satisfaction and enjoyment than ever before. It is very important to mention that they did not find this way of skiing riskier in terms of injuries. On the contrary, they find it safer and more efficient, which means that they can ski better, safer and more. We also found out that age was not a factor, since the patent was easily and enthusiastically adopted by the older generation (40+).

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EMPLOYING LIFESPAN PSYCHOLOGY IN SKI INSTRUCTOR AND COACH TRAINING

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Abstract

Progressive approaches emphasize the importance of viewing human development as a lifelong process. These perspectives view developmental opportunities in terms of where a person has been and where he or she is heading. Lifespan psychology views human development as multifaceted and as such it cannot be understood within the scope of a single framework. How one's life is played out is affected by social, environmental, and historical change. In our paper, we built upon the lifespan psychology paradigm - how the individual understands his or her own life which is being analyzed at the same time it is being created. Our belief is that the ski instructor's own life cycle is enhanced through personal introspection that can reveal a relationship with the self. The aim of our presentation is to share our research findings and experience from employing lifespan psychological approach in ski instructor and coach training.

Together with students from Faculty of Physical Culture, Palacký University in Olomouc we conducted focus groups, semi-structured interviews, and lifeline diagrams with ski instructors (level of education - 2, 3) and lecturers (level of education - 4) discussing their ski instructor careers. We analyzed the data in Atlas.ti employing qualitative analysis methods. Among our findings is that a significant factor affecting a ski instructor career is the social factor, and especially the personality of the lecturer at the first instructor course. The lecturer models not only skiing skills but also the way he or she interacts with the student. This finding has been further elaborated in our ski instructors and coach training. We adapted the "Lifeline diagrams" to "Ski line in snow diagrams" of our participants by asking them to draw their lifeline at the beginning of a ski instructors training course of Czech ISIA member organization APUL (Snowsports education). After sharing each other's ski line in the snow, it turned out that most of them had some key person (parent, sibling,

friend, ski instructor etc.) who inspired them to skiing. We encouraged the candidates to think about themselves as potentially becoming an important person in the life of a client they encounter as a ski instructor. Awareness of this potential can be valuable in terms of meaning-based motivation which is crucial for long-term sustainability of a ski instructor or coach career.

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DEVELOPING A PROFESSIONAL DEVELOPMENT PORTFOLIO TO ENHANCE LEARNING IN SNOWSPORTS.

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The British Association of Snowsports Instructors

Abstract

This paper will provide a unique insight into how a partnership between a University and a professional body has led to developments designed to support professional learning in Snowsports for instructors. The British Association of Snowsports Instructors (BASI), a professional training body, has worked in an ongoing partnership with The University of Edinburgh (UoE) to create courses which lead to internationally recognised professional qualifications in snowsports. Acting on feedback obtained via quality assurance mechanisms and informed by research in the area of professional learning, a new distance learning course has been developed to support snowsports instructors. In many other professions there is a requirement to provide evidence of ongoing training and professional development (Driessen & van Tartwijk, 2018). At present BASI requires all snowsport instructors to log their hours of practice at each level of the system and engage in professional development on either a yearly or three-year cycle depending on their level of qualification. Although there is an element of professional review in each level of the BASI system there had not been a discrete course focused on supporting career long professional learning.

Informed by practice in other professions, BASI and The University of Edinburgh engaged in a process of curriculum development to design a bespoke course for snowsport instructors seeking the highest level of qualifications in the system. The approach adopted was a Professional Development Portfolio (PDP) as this affords instructors the opportunity via experiential learning to identify areas of practice which they wish to enhance (Driscoll, 2006). Then via a range of approaches conduct ongoing enquiry to evidence and document the learning processes that they have undertaken.

The PDP aims to develop the tools instructors will need to be able reflect upon, make meaning from and learn from their teaching practice. The goal is to enable professional snowsport instructors to continue to learn and develop throughout their career. In the paper, details of how working in partnership led to these developments and how candidates are supported and expected to engage in the processes to create their own PDP will be presented.

Keywords: Professional learning, Professional Development, Portfolios, Vocational learning, curriculum development, experiential learning

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RELATIONSHIP OF THE RESULTS FROM FITNESS TESTS AND POINTS FOR PERFORMANCE IN ALPINE SKIING

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Abstract

The main motivation for this research was to verify the applicability of the fitness test as a predictor of specific alpine skiing performance in the Czech national team in the U14 and U16 categories. We wanted to verify if the results of the fitness test correspond with points for performance in the alpine ski disciplines (slalom, giant slalom, super giant slalom). In total of 66 men and women (categories U14 and U16), members of the Czech national team, took part in the survey. The participants were grouped by gender (women $n = 34$, age 14.17 (± 0.96), men $n = 32$, age 14.18 (± 0.96)). The categories U14 and U16 categories were grouped. The fitness test consisted of six individual tests and served as an instrument to examine the level of motor skills (box jumping, shuttle run 4x10m, standing long jump, an agility run with hurdles - boomerang test, twist test, 20m shuttle run - beep test). The points for performance in alpine skiing showed the best result from a single competition. The time from the competition was transferred to the points. In our research we looked for a relationship between the points from three different disciplines (slalom, giant slalom, super giant slalom) and the results of the fitness test. We used Spearman rankings correlations. Among the males we found a high correlation (at the significance level of $p < 0.05$) between super giant slalom and standing long jump ($r = -0.61$), giant slalom and boomerang test ($r = 0.49$) and between giant slalom and box jump ($r = -0.49$). A very low correlation was found between slalom and box jump ($r = -0.28$), slalom and twist test ($r = -0.31$) and between super giant slalom and twist test ($r = -0.23$). In the female category we found only a high correlation (at the significance level of $p < 0.05$) between super giant slalom and box jump test ($r = -0.34$). A very low correlation was found between slalom and shuttle run 4x10m ($r = -0.003$), slalom and twist test ($r = -0.05$) and between super giant slalom and twist test ($r = -0.04$). The Twist test had a very low correlation both in men and

women categories. We can say that the twist test does not correspond to the performance of alpine skiing. Due to the different significance of correlations between men and women, it might be necessary to adjust fitness testing as a predictor of alpine skiing performance according to gender. A prediction of alpine skiing performance based on the results of the fitness test is not possible in the category of women of a certain age.

Key words: Alpine skiing, Slalom, Giant slalom, Super giant slalom, Fitness test, FIS, FIS points, Points for performance in alpine skiing, Motor abilities

SELF-ASSESSMENT AMONG SKI INSTRUCTORS WITH DIFFERENT LEVELS OF BASIC ALPINE SKIING SKILLS

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Abstract

Ski instructors need to have adequate knowledge and skills in assessing sports techniques as a condition for successful intervention that will lead to improved performance.

The purpose of this research was to assess how instructors with different levels of performance evaluate their skiing skills. A total of 58 Instructor candidates were rated with a score of 1 (lowest) to 5 (highest) by Examination Board in 7 elements of basic alpine skiing technique: Gliding straight (basic position), Wedge swinging, Wedge curves, Basic turn, Basic swinging, Wide corridor and Narrow corridor.

After the practical exam, all candidates completed a self-assessment form on the same scale of 1 to 5 for each individual skiing element. The average practical grade of all seven skiing techniques, awarded by the Examination Board, was taken as a criterion for grouping. Three groups of high, intermediate and low skiing level were defined. The high-performance group consisted of a total of 16 candidates with an average grade above 4. The mid-level group consisted of 26 candidates with an average grade between 3 and 4, while the low-performance group comprised 16 candidates with an average grade below 3. The results obtained from the Examination Board and the Self-Assessment were compared to determine the degree of coincidence expressed as a percentage difference between these two scores.

From the results obtained, there is an evident difference in the objectivity of the self-assessment between groups. The high performance group showed the smallest percentage difference (9.79%) in the scores obtained by the Examination Board and the Self-assessment. The mid-level group showed a percentage difference between the two scores of 21.95% and the low-performance group of 54.04%. The high-performance group was recorded also by several individuals who underestimated their performances, which is not the case with the other two groups. There is a significant overrated self-perception in the intermediate group and especially in the low skills group.

The conclusion is that the higher level of performance increases the degree of objectivity of self-assessment. This rate of self-estimation and awareness of body position is probably due to the higher skiing experience of the candidates with the highest level of performance.

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CORRELATION OF MOTOR ABILITIES AND BODY CHARACTERISTICS OF YOUNG MALE CATEGORIES WITH PERFORMANCE IN INDIVIDUAL DISCIPLINES IN ALPINE SKIING

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Abstract

The purpose of the paper was to present the correlation between the motor abilities and body characteristics of the younger male categories with the performance in individual disciplines of alpine skiing. The sample consisted of 26 alpine skiing racers (age 15 and 16) from the U16 category. They were all categorized athletes at the Slovenian Ski Association and had actively competed in the competition VN Nordica Dobermann in the season 2018/2019. Nine variables of motor abilities and four variables of body characteristics were tested. For competitive performance, the criterion was the number of points scored for the competition VN Nordica Dobermann, separated by discipline. Analysis in boys shows the correlation of some motor abilities with competitive performance. We found that performance in the slalom was correlated with the ten-jump ($r = 0.39$), agility ($r = -0.40$), pull-ups ($r = 0.48$), and height jump ($r = 0.48$). In the giant slalom, the correlation is in the tests, ten-jump ($r = 0.41$), running 400 m ($r = -0.43$), balance ($r = -0.41$), pull-ups ($r = 0.70$) and height jump ($r = 0.42$). In the super giant slalom, the correlation is in the tests, running 400 m ($r = -0.41$), balance ($r = -0.48$) and pull-ups ($r = 0.59$). No correlations were found in the analysis between body characteristics and performance in boys. Multiple linear regression analysis also revealed no correlation between the model of all nine variables of motor ability and performance. In the analysis of the model of all four body characteristics and performance, however, the correlation ($R^2 = 0.28$) is with the giant slalom. Therefore, we found that boys' competitive performance in giant slalom can be predicted from the variables of body characteristics with a 28 % explained variance. Considering that the analysis of the data did not confirm the greater correlation of motor abilities and body characteristics with the performance in individual disciplines of alpine skiing, we conclude that performance is influenced by some other dimensions, which were not included in the analysis.

Methodological limitations must also be considered when interpreting the data, since the sample was relatively small.

For future research, we suggest updating and expanding the battery of variables for alpine skiing performance prediction and practice testing, as this could give more certainty about what are the variables that determine success in alpine skiing and its disciplines.

“WITH US ON SKIS”

CENTER FOR SCHOOL AND OUTDOOR ACTIVITIES

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Abstract

The Center for School and Outdoor Activities (CŠOD) is a state institution that conducts extracurricular which carries out out-of-school classes and other outdoor programs. It is the most important organization in the field of outdoor education in Slovenia. The Ministry of Education, to which it belongs, finances its work. At present, CŠOD consists of 26 dormitories and multi-day programs scattered throughout Slovenia. CŠOD facilities are used by pre-schools, primary and secondary schools, faculties and other organized groups, especially on weekends and holidays. The main goal of CŠOD is outdoor education using specific methods to achieve the goals set in the school curricula.

In the nature school, science, social sciences and sport are interwoven. During the winter, 11 centers around Slovenia run a so-called "winter school" in nature that focuses on alpine skiing. Last year there were 118,979 participants in the CŠOD. 54,198 school participants, of which 4,824 are in alpine skiing.

According to the popularity we have decided to create a didactic film about alpine skiing called "WITH US ON SKIS". The film shows the path of skiing from the beginning to the end of the Slovenian Alpine Ski School program, with the emphasis on safety, the initial forms of skiing, learning to ski, the use of chairlift and learning by doing ski.

In the presentation, ski instructors Snežana Jug and Aleksej Kuzmin, as well as children - beginners, through various exercises in the snow, show the safe, playful and interesting way of learning alpine skiing. Our greatest wish is that the film will be a first positive experience for skiers, both beginners and experienced ones.

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ENHANCING MOTOR LEARNING THROUGH INFORMATION TECHNOLOGY IN ALPINE SKIING

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Abstract

Alpine skiing requires aerobic and anaerobic power, muscular strength and a variety of complex cognitive-motor abilities, such as coordination, speed, balance, agility, flexibility (White & Johnson, 1993). The degree of difficulty and the duration of the race determine the energy and strength requirements of the ski competition, which underlines the importance of strength and conditioning program for alpine skiers. The aim of such program should be to maximize strength, throughout the force velocity curve with emphasis on eccentric force generation and explosive concentric power generation at slower speeds and to develop strength endurance—capacity to maintain force and dexterity of force from 45–150 seconds (Hydren et al., 2013). On the other hand, less emphasis is placed on techniques that would provide improvements of complex motor abilities and consequently result in a few milliseconds of improvement that results as a possible victory. Recent advances in information technology (IT) for sport performance enhancement brought new approaches to deal with training optimization and real-time correction of motor learning and re-learning process. The aim of this study was therefore to review the current IT options that could be used to enhance cognitive-motor learning in alpine skiing.

Electronic databases of scientific articles were searched, and reference lists of relevant articles were checked in order to assess current literature in the field of IT usage for motor learning in alpine skiing. The search was not restricted to any publishing date. Included articles were only studies published in English.

The literature in the field of IT usage in skiing is scarce. Recent articles describe the usage of wearable sensors to track and consequently enhance skiing performance. Moreover, the virtual reality (VR) with the ski-simulator apparatus could be used for motor coordination and

learning as well as relatively new systems (e.g.: FitLight Trainer) to enhance agility and speed of processing.

In the framework of this study we will provide a theoretical background of the importance of cognitive-motor learning with an IT application for alpine skiers. A practical concept of IT application for improving processing speed, agility, coordination and visual cognitive processing will be presented, which can later be used for the purposes of athlete's improvements and/or intensify the learning process while skiing.

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INJURIES AND ILLNESSES DURING SKIING LESSONS FOR KINESIOLOGY STUDENTS

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Abstract

The program at the University of Zagreb includes 75 hours of alpine skiing lessons. The practical part of the lessons is conducted out of Zagreb, as field lessons in a ski resort. During the whole stay the students go skiing for undergo 10 days and during this time they are accommodated in a hotel. The aim of this study was to describe the most common injuries and illnesses that occur during the 2 seasons and that cause the absence from skiing lessons. The total number of skiing days in two seasons was 4180, attended by 418 students in ten groups. Most of the students were Croatian, but 10% of international students (through the Erasmus exchange program and similar) also attended classes.

On average, there were about 5 injuries and 10 illnesses of varying intensity per 1000 skiing days (or per 100 persons over 10 days). The most common reason for lost ski days was increased body temperature (usually 3 to 5 per group), which in total accounted for slightly less than 5% of all participating students. The variance of this symptom between the groups was high, since in some groups there was a spread of the general flu. In case of a flu, it would have been expected that at least 10 to 15% of the students in the hotel would have been affected and would have lost an average of 3 days of ski lessons. In case of a cold, the absence from skiing was on average less than one day. The other common complaint was diarrhea (in rare cases with vomiting), which occurred on average in 1 to 2% of students and usually responded well to a single dose of loperamide and rarely resulted in more than one day's absence. The injuries consisted mainly of knee injuries; a stretching of the MCL, which sometimes returned to teaching after two days (3 injuries/100 pupils/10 days) or more severe knee injuries (1/100 pupils/10 days) and various lacerations (1 to 2 /100 pupils/10 days). Common

complaints were compressions of ski boots, which led to blisters and wounds (on average 5/100 pupils/10 days), which in some more severe cases necessitated absence from skiing. Other injuries were rare and included contusions, shoulder dislocations, thumb injuries, hematomas from falls and (1/100 students/10 days). Other complaints were also rare and included toothache, which in 2 cases required the attention of the dentist, conjunctivitis, headache, an allergic reaction of the penicillin skin and, interestingly enough, a cat bite and a brown hermit spider bite (probably).

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BEING A SKIMASTER!

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Abstract

“One of the naivest logics I keep running into, and which I do not understand, nor do I understand those who use it: I keep doing the same thing and still expect a different result!” (Muri, 2019)

Following the book and movie *The Edge!* (2013) as well as the movie *7 to Heaven* (2016), the book is the continuation of the trilogy and its last part at the same time, *Being a Skimaster!* (2019)

The book is therefore a slightly different book on skiing. Not because the author would disclose a self-revealed winning recipe, but mostly because of his effort to demonstrate a different view on what the development of contemporary alpine skiing brings every day.

To be more convincing and to easily understand, the book guide you through most of the themes with examples from author’s personal experience by presenting numerous problems and solutions in training of the contemporary ski technique and of skiing in general. In one of the chapters, author’s refined ski technique perception and its details mostly invisible to the average observer, will be discussed by our best skier Tina Maze. All her statements are quotes taken from the movie *7 to Heaven*, where the most significant “secrets” of top-class turn performances were analyzed. We simply named them the contemporary skiing axioms. This topic deals exclusively about things that really happen on the terrain, and about what author actually does - merely facts and final results! Regardless of the sports discipline, the basics of sports training is the same. So, one of the chapters is dedicated to the important psychological questions of an athlete written by Sara Isaković. She is not only Olympic silver medalist, but graduated psychologist at Berkeley University. She shares her exceptional experiences in the chapter *Fears and expectations*.

Additionally, the book includes topic as follows:

- Wide range of knowledge, not copying,
- Top performance, top understanding,
- Less is more,

- The technique is a rule,
- Students over and over again,
- Novelties and the carving technique, which is not all that counts!
- Accept, add, develop.
- A talent or an exceptional feeling?
- skiing axioms;
- Teaching the ski racing technique in junior categories;
- Fears and expectations.

The intent of the book *Being a skimaster!* is to readers not only enjoy the content with all the numerous unique photos, actions captured in the pages, but to be also more closely associate with the author's thought: "Life is beautiful, skiing is both!"

SNOW RECRUITER - CONNECTING INSTRUCTORS AND SCHOOLS

Ana Pišot, Meta Lavrič

*www.snow-recruiter.com – An online portal that connects Snowsports instructors
and schools*

Ski Instructors and Trainers Association of Slovenia (SITAS) & SLO Demo team

Abstract

Ski schools are searching for certified instructors around the world. Full-time or part-time, for the whole season or just for the peak weeks, the locals or instructors from other countries. With Snow Recruiter, a centralized database of instructors, ski schools can now find and contact them through the world wide web.

Snowsports instructors' profiles contain information about their certifications, experiences, languages they speak, their availability and other information.

They have the ability to apply to job postings or contact schools directly.

Snowsports schools' profiles contain basic information about their school and resort.

They have the ability to search for specific (instructor's) characteristics and contact them or post a job vacancy.

A **search engine** connects them and gives them the opportunity to work together in the next season or next week.

Snow Recruiter encourages enthusiasts to become Snowsports instructors, helps schools find much needed instructors for the peak weeks and contributes to a healthy competition in the human resources field of ski schools around the world.

Skiing is the best job in the world!

SKIING IS (STILL) A GAME

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Abstract

Over the last 15 years, several books have been published in different languages under the auspices of a group of authors with the common title and focus that “*Skiing is a game*”. The revaluation of the Slovenian, Italian, Croatian, and English versions have complemented the understanding while broadening the horizons of its audience. These alpine ski instructors and trainers have appreciated the simplicity while benefiting from the comprehensive approach addressing the challenges of teaching skiing that are laid out in the current edition.

Today, prior to publication, we have the fifth version of the book - this time in Serbian, which complements the previous content. The authors have been drawn together based on their common desire to find truth in the art of teaching skiing to children while respecting and adhering to the science and pedagogy. While balloons and colored hoops aren't really what you think of when you imagine a scientific laboratory, they are part of our laboratory. Simply, the laboratory where children learn to ski. Specifically, it is where children love to ski, and love to learn to ski. Play and the accompanying movements that facilitate growth while allowing the child to blossom as a skier are introduced. This pathway is designed to allow the child to progress at their own indigenous developmental rate. Understanding this, leads us, the practitioners, to an appreciation that children cannot be forced to ski. Skiing is a child-like activity, and when it is treated as such, the love of skiing grows within the child.

Science forms the backbone of this book. Some readers will find the term “science” obtrusive or irrelevant to teaching, as they think of teaching as more of an “art”. The authors couldn't agree more with this need for the “art” of teaching. But just as a painter needs paint brush, a teacher needs subject matter.

This book offers an insight into the process of teaching skiing from the perspective of students and teachers. It provides the teacher with tools to guide the way to skiing knowledge in the most creative and personalized way.

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INTERGENERATIONAL DIVERSITY ON THE SKI SLOPES - WHAT DO SKI INSTRUCTORS NEED TO KNOW?

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Abstract

In the media we have witnessed frequent categorizations of people according to generations (x, y, z generations). Despite possible stereotypes, knowing how a particular generation phase characterizes people helps us to understand their actions, behavior and values.

Ski Association of Slovenia, is today facing 5 different generations of ski instructors, therefore a critical look at the essential characteristics of the generations is welcome for all those who work as ski instructors and with children, teenagers and parents. The purpose of this paper is to highlight the generational characteristics of Slovenian ski instructors and give some guidelines to make ski instruction more successful and fun.

In order to obtain clear picture of active ski instructors we have analyzed the data from MARS - Ski Association of Slovenia's application for electronic assessment of membership, Blue Card holder and licenses, received on 27 January 2020. Data on the professional title, gender, valid license (validity and type) and the age generation of the ski instructors were analyzed. The age generations were defined as "traditionalists" (born before 1945), "baby boomers" (born 1946-1964); "generation X" (born 1965-1976), "generation Y" (born 1977-1997) and "generation Z" (born after 1997). The descriptive statistics and the χ^2 test for asymptotic significance with respect to age generation and gender were performed with significant decisions accepted on $p < 0.05$.

The MARS application contained 3,286 personal records with various professional qualifications in Alpine and Nordic skiing, of which 2,803 hold a ski instructor title and 1,689 (51%) a valid instructor license. Only active licensees were analyzed, with 28.7% were females and 71.3% were males. The χ^2 test confirmed uneven distribution of the age generations of licenses holder of different levels ($P < 0.001$).

The representatives of the "Generation Y" (n = 847) dominate with the title U2 (51%) of the IVSI licenses and also have the largest share in the ISIA licenses (48.4%), followed by a quite well represented "Generation X" (IVSI 24% and ISIA 17.3%) and "Boomers" (20% ISIA, 17% IVSI), which together make up more than 40% of all active ski instructors. The "Generation Z" are the least represented, as they are only just becoming ski instructors. Surprisingly, there are 8 representatives of the "traditionalists" who, despite their age of more than 75 years, are still holders of ISIA licenses. The X2 test also confirmed uneven gender distribution of license holders at different levels (P 0.001), with males having the highest relative share of ISIA licenses (81.6%), while they are lower in IVSI (68.4%) and ZUTS licenses (61.4%).

Considering the fact that the majority of ski students are pre-school and school children, the ski instructors train representatives of Generation Z who are characterized as cautious, pragmatic, global, outgoing, unique, visual and high-tech. They are the most "networked", educated and cultured of the previous generations, but also the most "sedentary", overweight generation, with poorly developed physical and social skills, with less contact with nature, with shorter attention spans, but at the same time very multitasking.

Ski instruction and teaching for the Generation Z (also new Generation Alpha born 2010 on) should be dynamic and include clear instructions, focus on visual demonstration, including technology where possible (video analysis on the slopes, immediate feedback, e-gadget games), encourage participation in the lessons and support active cohesion. In addition, the ski instructor must also be well equipped to communicate with the parents (Generation Y), so that the child's goals in skiing (playing on snow) can be better understood and captured by parents' objectives (technical knowledge).

Keywords: intergenerational diversity, educational approach, ski instructors, licenses

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MARS – application of ZUTS (Ski Association of Slovenia) for electronic assessment of membership, Blue Card holder and licenses

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COMPARISONS OF THE PHYSICAL FITNESS OF TWO GENERATIONS OF COMPETITORS IN THE ALPINE SKIING

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Abstract

The study compared the physical fitness of two generations of alpine skiing competitors. The sample included 71 U16 alpine skiers aged 14 and 15 years. From the existing model of potential competitive performance, we selected three tests of physical fitness (movement in the eights around cones, ten-jump on both legs, a triple jump from the spot). The measurements were conducted in 2006 and 2016. T-test for independent samples or Mann-Whitney test were used to assess the differences in selected physical fitness tests between skiers born in 1992 and 2002. Statistical significance was set at an α level of 0.05. The results of intergenerational comparisons in males born in 1992 and 2002 and in females born in 1992 and 2002 show no statistically significant differences in most of the selected variables. Results showed statistically significant differences in favor of the younger generation in males only in the variable triple jump from the spot ($p = 0.023$). In this variable, the differences are more than half a meter in favor of the younger generation. This may be due to the greater emphasis on single-leg explosive strength training in the alpine skiing training process in category U16. The reason for the aforementioned fact can also be found in the understanding of the modern alpine skiing racing technique, which requires a more pronounced and early loading of the upper, later external ski in the turn. Comparisons between males of the 1992 and 2002 generations and females of the 1992 and 2002 generations showed no statistically significant differences in the other two variables (movement in the eights around cones, ten-jump on both legs). Nevertheless, the results showed progress in the younger generation. The findings confirm the orientations and emphasis of the training in younger categories, which is much more oriented to the development of

single-leg strength, because of the understanding of the modern alpine skiing racing technique.

Keywords: motor skills, competitive performance, training planning

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THE LEARNING CONNECTION – A FRAMEWORK FOR SNOWSPORTS PROFESSIONAL DEVELOPMENT

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Abstract

The theme of the 2019 Interski in Pamporovo was the future of snowsports. The U.S. team presented the Learning Connection model, identifying three skillset areas of professional development; people skills, teaching skills and technical skills, striving to answer the question: “what makes a great instructor?” In particular, the effort to separate interpersonal skills from pedagogy reinforces development of connection and engagement behaviors that are measurable and therefore learnable. Historically, most great teachers and defined quality teaching skills include extraordinary people skills such as relationship building, communication, empathy and emotional intelligence. The Learning Connection model defines the three skillset areas and identifies fundamentals in each area to aid in development awareness for a more well-balanced educator. This presentation will take a deep dive into the methodology behind the Learning Connection model, the fundamentals and how the framework is being used to create the learning outcomes for new national certification standards across all snowsports disciplines including: Adaptive, Alpine, Cross Country, Child Specialist, Freestyle Specialist, Snowboard and Telemark. Regardless of the discipline, teaching skills are inherent and people skills facilitate better trusting relationships and student engagement to go deeper in learning. The future of snowsports education depends upon a greater connection to the learning and a lasting enthusiasm for the sport. We will discuss methods for people skills assessment in training and certification and how development of this skillset can foster connecting to a more diverse learning community of guests coming to resorts.

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IMPOSED RHYTHM OF SKIING AS AN IMPORTANT UPGRADE OF SKI KNOWLEDGE

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Abstract

Nowadays, ski knowledge is evaluated as too poor and not being on the level required for predictable and safe skiing. In addition to excessive speed, we can also point out the lack of skiers' ability to control their skiing. Both factors contribute to the insufficient ability of manoeuvring. By skiing this way, the skier is not able to perform turns in a predictable way and is therefore endangering himself and other skiers. Since we are normally not skiing alone, we are responsible to ourselves as well as others! What are the key reasons for this situation and what can / must we do in order to change things for the better? In general, the passive exploitation of ski's geometry is still the key reason for the aforementioned problems. Another factor is the focus on the lateral movement (side-to-side movement) which does not serve the real need in recreational skiing! Since the skier's position is too low and generally similar to the seating position, the skier is constantly "under water"! Poor ski knowledge, which is shown in the limited ability to react in a timely manner, contributes to the significant lack of safety in modern alpine skiing. This raises the following questions: Do skiers are drivers or passengers? Who is skiing – the skis or the skier? It has to be taken into consideration that in recent years, this segment has been neglected. Have we put too much emphasis on utilizing the desired change of direction exclusively with the help of the passive use of the ski's geometry – generally on easier slopes, where speed control and the ability to manoeuvre, which are (still) two key elements of ski knowledge, are not among the dominant characteristics of skiing? There are numerous ways of upgrading ski knowledge by practising the imposed rhythm of skiing. One of the key ways is skiing in different formations and on different courses. Skiing in formations is an important upgrade in the process of ski learning. A performance of turns behind, above or beside the skier is an important way of consolidating the gained knowledge. Skiing on different courses and terrains (markings, gates, waves etc.) is another precise and targeted way of gaining valuable skills.

Both of the mentioned learning techniques are appropriate in order to gradually improve the much needed "ability to manoeuvre" while also taking into consideration the level of ski knowledge! Skiing in pedagogically orientated "ski kindergartens" can be a valuable support.

Why do recreational skiers find formations and courses so difficult and at the same time so interesting? The reason behind that is the imposed rhythm of skiing. It is difficult because adapting to it is a complex and demanding task, and it is interesting because "catching the partners and gates" is very exciting. That why the reason, the need and the different ways of learning to utilize the imposed rhythm of skiing will be presented.

Key words: imposed rhythm, ability of manoeuvring, speed control, predictable way, formations and courses.

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DIFFERENCES IN SKELETAL MUSCLE CONTRACTILE PROPERTIES BETWEEN SPEED AND TECHNICAL EVENTS IN ALPINE SKIING

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Abstract

Tensiomyography (TMG) is a reliable non-invasive technique that detects radial muscle belly thickening and oscillations during isometric electrically elicited muscle contractions. Its parameters correlate to muscle composition (Šimunič et al., 2011), muscle atrophy/hypertrophy and muscle tone/stiffness (Šimunič et al., 2019). Method has been widely used in sport sciences but never in alpine skiing. Therefore, we will present the only alpine skiing study that compares TMG-derived contractile properties of two knee extensors between two groups of world cup skiers: technical events (TE, giant slalom and slalom) and speed events (SE, super G and downhill racers). We measured 14 world cup racers (age 27±3 years; height 190±5 cm; mass 87±7 kg) that were divided in two groups (TE and SE) of 7 racers, based on their best alpine discipline. TMG was used to assess vastus medialis (VM) and lateralis (VL), in both legs, and in different knee angles: from fully extended knee (0deg) to 90deg flexion, in steps of 10deg. From maximal TMG response five contractile parameters were extracted: Delay time (Td), Contraction time (Tc), Sustain time (Ts), Half-relaxation time (Tr) and maximal displacement (Dm). SE has shorter VM Tc in knee angles from 20deg to 90deg ($P < .05$), while TE has shorter VL Tc in knee angles from 0deg to 10 deg ($P < 0.025$). SE has smaller VM Dm only at 60deg knee flexion ($P = 0.048$), while TE has smaller VL Dm in knee flexions from 0deg to 20 deg ($P < 0.035$). We also found that TE has consistently shorter Ts in both muscles and both legs ($P < 0.47$). In general, shorter Tc is correlated to higher proportion of type II muscle fibres, which is most likely not the case for this study. We must consider optimal overlap of both contractile proteins in different angles (e.g. number of consecutive sarcomeres) to explain differences found in Tc within different angles and both groups.

Further, Dm was previously found to negatively correlate to muscle tone and/or stiffness changes. Therefore, we could say that smaller Dm could explain higher muscle tone. Ts was never validated in previous studies; however, one might expect that those athletes with higher frequency of movement would have also shorter Ts. In conclusion, TMG could be used to assess and individualise sport specific training in alpine skiers; however, we must consider knee angle as an important factor of TMG assessment.

Key words: Tensiomyography, Contraction time, Muscle contraction, Muscle tone, Muscle Stiffness

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PROGRAMME OF ALPINE SKIING AS AN EXTRACURRICULAR ACTIVITY FOR ELEMENTARY SCHOOL STUDENTS

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Abstract

Nowadays skiing is just one of many sports activities to enrich our free time activities. At the same time, it presents a huge financial burden for those who want to ski, especially for parents, on the other hands this should not be the reason for not including children into sports activity, because skiing is a winter outdoor sport which contributes to a healthy way of life also in the adulthood. Therefore, it is worth trying and striving for constant improvements and upgrading by various methods and programs, enable the children to be included and to improve their skiing skills. In this process an important role plays ski teacher who has to be professionally trained, as well as susceptible to novelties and at the same time able to apply his/her knowledge to children in a funny and professional way.

We would like to present the idea of children's motor preparation for the ski season and the ways to upgrade their skiing skills. The program entitled »Alpine Skiing in Elementary Schools« should become a part of extracurricular sports activities. It is intended to be performed throughout the whole school year for the children who are showing interest or talent for skiing. The program includes many sports contents important for the development of motor and functional skills which play a significant role in preparing children for skiing. Many useful exercises (for coordination, balance and other exercises to improve the skiing technique) are presented and described for the wintertime, when a part of the program for perfection of the ski knowledge is carried out. These exercises can be performed in different ways: in free skiing, in settings and by using various requisites. Throughout the program we will pursue the goals by presenting the importance of the sport for the children, introduction of the FIS rules and ski equipment, the national school of alpine skiing and its program, and alpine skiing as a part of extracurricular activities for elementary school students.

The aim of the program is to help those who are dealing with ski teaching of children and to enable higher quality of their work. The use of various requisites and the skiing on the ski polygon will make their teaching easier and more attractive to the children, and thus ensure an improvement of their skiing skills.

COMPARISONS OF THE MORPHOLOGICAL CHARACTERISTICS OF TWO GENERATIONS OF MALE AND FEMALE COMPETITORS IN ALPINE SKIING

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Abstract

The main aim of the research was to compare the morphological characteristics of two generations of male and female competitors in alpine skiing. The sample included 71 U16 alpine skiers aged 14 and 15 years. From the existing model of potential competitive performance, we selected two morphological variables (body height, body mass). The measurements were conducted in the years 2006 and 2016. T-test for independent samples or Mann-Whitney test were used to assess the differences in selected morphological characteristics between skiers born in 1992 and 2002. Statistical significance was set at an α level of 0.05. The established intergenerational differences in body mass in males can be attributed to significant changes in the training process and an increased emphasis on training of various manifestations of strength. For females, on the other hand, a comparison shows that the younger generation has a lower body mass. This could be due to healthier eating habits, as well as the content of the training process, which is based not only on practicing various forms of strength are also based on the development of other components of physical fitness such as coordination, endurance, balance. Regarding the body height, we established no statistically significant differences in any of the compared groups of participants. Both intergenerational comparisons of male and female groups showed that the younger generations of men and women (born in 2002) were higher than the older generations (born in 1992). The reasons for the given fact are mainly predominantly genetic. On the other hand, in recent years the awareness of the possible negative impact of an improperly managed training process for younger categories in alpine skiing has developed. The latter is particularly evident in the

training process of various forms of strength, which can have a negative effect on body height. Therefore, during the development period, the strength training, process should completely avoid the use of additional weights/loads.

Keywords: body measurements, competitive performance, training process

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TRANSFER OF A BASIC SKI KNOWLEDGE TO THE TRAINING OF ALPINE SKIING COMPETITION TECHNIQUE

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SLO Demo team

Abstract

The hierarchy of the basic elements of Slovenian National Alpine Ski School is based on the acquiring of timing, precision, rhythm, speed and softness of skiing. Through an effective upgrade to all the basic features of modern alpine skiing, we want to enable every learner to make the best possible progress in skiing knowledge. Our main goal is to provide a systematic and direct path to perform a competitive ski turn at an appropriate speed. A basic condition for further training of the alpine skiing technique is therefore a high level of skiing skills. On the way of development of the top competitor, the first set of technical training is focused on giant slalom as the basic discipline of alpine skiing in Slovenian National ski school. Each young competitor has first to upgrade a good competitive skiing technique through free skiing. The next important step in his progress is skiing through simple polygons with basic markers and with the focus on timing and precision as the most important points in giant slalom discipline. The second set of competitive technique training is focused on slalom training, which is less dangerous from the aspect of velocities, but it is more complicated from the point of rhythm, precision and timing. The third (highest) set of elements of the training technique training is intended to the training of most demanding disciplines with the highest velocities and forces in SG and DH turns. Because of injury prevention the GS/DH training must be planned even more carefully and with the highest standards of safety which is also reflected in higher costs of training.

ANALYSIS OF TEN YEARS OF SITSKI DEVELOPMENT CAMP IN SLOVENIA

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Abstract

The Slovenian Association of Paraplegics in cooperation with Paralympic committee of Slovenia is an annual organizer of sitski development camp for people with spinal cord injury. The camp is organised since 2009. It takes place in a Slovenian ski resort, which can provide facilities for approximately 15 persons on wheelchair and shows great support and acceptance for para alpine skiers on slopes.

We have collected the data about participants on sitski camp since 2009 and made a basic statistic. We were most interested in how a promotion of the camp affected on development of para alpine skiing.

Overall, 48 different people have attended the camp since 2009 at least once, making a total of 160 participants. When the camp first started, 30 % of participants could already ski and 70 % were beginners. Nowadays the numbers are reversed. Every year people with spinal cord injury comes back to improve their skiing knowledge, maintain skills and physical fitness and be part of the skiing society. There are only 15 % of female sitskiers recorded in all ten years (8 females out of 48 participants). The youngest participant was 8 years old when she first attended the camp. In 2014 the camp became international with guests from Croatia and Bosnia and Hercegovina. Every year there was a minimum of 3 new participants (Table 1), the most massive participation was in 2010, when there were 15 fresh sitskiers and again in 2014 with 10 new ones. We cannot be certain of the reasons for that, but we believe the fact that 2010 and 2014 were the years of winter Paralympic events, when promotion of the sport is greater, played an important role. The number of participants depends on the economic and health status of the participants, the weather conditions and promotion quality in local organisations. Social networks prove to be crucial, as it is very common, that a new participant comes on invitation from another person with disability, who had a positive experience at the sitski camp.

Table 1: Statistics overall for all 10 years is as followed

Year	Participants	New participants
2009	12	7
2010	23	15
2011	11	3
2012	14	3
2013	12	3
2014	26	10
2015	14	3
2016	18	5
2017	17	3
2018	18	3
2019	16	4
2020	21	3

Teaching para alpine skiing follows the national skiing school system with additions that are specific to para alpine skiing. We start with initial forms of skiing (transferring from wheelchair to sit ski, adapting to equipment and snow, warming up, teaching how to fall and get up, sliding, stopping) followed by the basic forms of skiing (basic individual turn, series of turns in one direction, basic connected turns and using ski lifts). Skiers who master basic skiing technique are ready to start with dynamic turns on the edge.

We give great importance on providing a good experience in order for our participants to feel safe and have fun on the slopes and consequently become recreational para alpine skiers.

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ARE GENERATION-Z FEMALE ADOLESCENTS INTERESTED IN ALPINE SKIING?

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Abstract

Slovenia is considered to be a “skiing country”. Unfortunately, in last two decades we noticed be a drop of interest. When observing the neighboring ski resorts, the population of skiers is mostly middle aged (“boomers, generation X”) and we noticed a small number of younger females (“millennials, generation Z”) on the slopes compared to the situation in 80’s or 90’s. For that reason, the aim of this study was to provide a pilot insight into interest for skiing in teenage female population in Slovenia. The second aim was to explore the relation between the parental skiing habits and the interest to ski in teenage girls.

A short survey was distributed in one of the biggest vocational high schools in Ljubljana, where students coming from different parts of Slovenia, as the entry requirements to this school are moderate, so the school is appropriate to execute the research. The survey was administrated through mobile application but was overseen and filled in only after face-to-face instructions. It consists of only nine items, to grant the better response.

Altogether 323 surveys were collected but only female students (n= 270) were analyzed for the purpose of the research question. Almost 90% female student know how to ski (38% learned before, 30% in elementary school, 20% during obligatory winter school and only 1% in high school). Nevertheless, 52% did not ski at all in last 3 years, and even worse, only 30% of them ski regularly every year. We found out low number of ski days as 37% skied only 1 or 2 days and another 40% only 3-6 days per year. Only small number (10% to 20%) of female students skied actively, if we consider an active skier to be a person with over 6 days of skiing per year.

From the perspective of parents' ski habits, 48% fathers and 34% mothers do ski, either regularly or from time to time; some used to ski but stopped; while 22% of fathers and 41% mothers do not know how to ski at all. In regard to the mother and father influence there was an expected extremely strong relationship between fathers who ski(-ed) and female student (daughter's)skiing ($\text{Chi}^2 = 37.34$; $p < 0.0001$), mothers and girls ($\text{Chi}^2 = 33.33$; $p < 0.0001$) and the strongest with two parents skiing ($\text{Chi}^2 = 59.35$; $p < 0.0001$). There is, of course, always the of reasons and we expose the question of money (Malevska, 2018), but results of the answers to "If you would be offered a one-week of free skiing holidays, would you go?" where almost a half of female students refuse it and would rather go somewhere else instead give us surprising picture that the reasons lie somewhere else.

In conclusion, if the number of skiers continue to drop there will be less and less future parents who ski and, despite their important influence the future trends will be even worse no matter of the condition for skiing (closeness of ski resorts, etc.). During the ski course in elementary school we should address to change the attitudes toward skiing and winter activities to be loved since childhood.

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THE BENEFITS OF THE COURSES IN SNOW SPORTS FOR STUDENTS OF THE NATIONAL SPORTS ACADEMY "VASIL LEVSKI"

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Abstract

The "Snow Sports" course at the " " National Sports Academy has a multifaceted influence on the participants and the benefit they derive from it is much more than the acquisition of new motor skills. The combination of physical activity in a protected natural environment definitely brings great benefits to the participants. The main benefit of the research was the introduction of six multi-aspect groups of benefits:

- physical health,
- mental health,
- socialization,
- education and training,
- ecology and environmental protection and
- a new profession.

The current research involves 1200 students aged 19-25 years for the period 2016-2019, in the research we have used the following methods: Survey Method Spielberger Test for Situational Anxiety Testing, measuring and diagnosis of Physical Development Standard Unmeasured Physical Exercise Test - Ruffier Sample and measurement of anthropometric indicators and tracking changes in the BMI.

The results obtained show a clearly pronounced tendency to improve the physical health of the participants, a positive influence on their psychological well-being and a sense of achievement and success through new contacts, friendships and a specific social environment. The research participants have stated that they have changed their attitude towards the natural environment and already feel closer to it.

At the end of the course the fear of the situation was reduced, and HR improved by 10.26%. The improvement in functional status according to the index scale for all students is 25.74%. The participants have developed new knowledge and skills related to snow sports, which is a precondition for their future development in a new profession.

Most of the participants expressed their willingness to continue practicing snow sports after their participation in the project.

Keywords: mental health, physical health, socialization, snow sports course

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