METHODICAL MODEL FOR CORRECTION OF A COMMON MISTAKE IN THE SNOW PLOW BOW TURN PERFORMANCE

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Original scientific paper

Abstract

Expert coaches' experiential knowledge often provides a wealth of valuable information on designing effective learning environments in alpine skiing. There are not enough studies on the role of experiential knowledge of ski coaches in facilitating skill learning in skiing and the integration between theoretical frameworks and their experiential knowledge. The purpose of the present study was to investigate the formation of an expert model of the most important methodical exercises for correcting the error which most interferes with performing snow plow bow turn. The respondent sample consisted of 20 skiing experts aged 25 to 45. Through email correspondence between the paper authors, the experts first defined the typical errors which most often occur performing snow plow bow turn and then, on a scale from 1 to 3, selected the three errors which most interfere with its proper performance. Following this, the experts defined a methodical model of the exercises for correcting the error LB (leaning back), which most interferes with performing snow plow bow turn and, on a scale from 1 to 5, graded these 5 methodical exercises based on their significance in the correction of this error. In accordance with the objective set by the study a nonparametric chi - square test ($\chi 2$) was used. We tested the statistical significance of the differences (p) in the frequency of the expert evaluation of the three errors that most interfere with its proper performance, and in the evaluation of the five methodical exercises which, in the formed expert model, have the highest significance in the correction of the LB error. Based on the obtained values of testing the frequency of the expert evaluation of the three errors that most interfere proper performance of snow plow bow turn, it was observed that there was no statistically significant difference between them ($\chi 2 = 8.33$; $p = 0.08$). There was statistically significant difference between the most efficiency methodical exercises for correcting the LB error typical of performing snow plow bow turn ($\chi 2 = 22$; $p = 0.02$). Obtained data have an exceptional significance and make for a unique structure of the methodical programme for teaching snow plow bow turn. In practical application, they should ensure the valuable information and methodical instructions for teaching snow plow bow turn to skiing instructors of various expertise levels.

Key words: e*xpert model, alpine skiing, methodical exercises, basic ski school.*

Introduction

Training of alpine skiers is a complex process that depends on the constant improving of skiing equipment. The type of snow surface traversed, the coaches' expertise levels, and individual factors such as motivation and physical preparation age and anthropological status level of those who being trained. Expert coaches' experiential knowledge often provides a wealth of valuable information on designing effective learning environments in sport (Greenwood et al., 2012). In the process of teaching alpine skiers especially important significance have ski school programs. In ski school the principle of progressivity means that learners develop from easy activities designed to ensure safety and progression to more advanced skills, for example, from the snowplough turns to the parallel ski. The snow plow bow turn has numerous functions including ensuring that a skier can stop and is relatively safe on the slopes. Through progression the skier moves into parallel skis and snow plow bow turn and eventually into parallel turn. A high-quality and professional assistance provided by skiing instructors or coaches is the key factor in the process of acquiring and perfecting skiing knowledge (Bucher et al., 2014; Maleš et al., 2013). Effective coaching is a mixture of pedagogy and principles of sciences, e.g., motor skill acquisition, sociology, and physiology, often referred to as the science of coaching. Instinctive or intuitive coaching has often been incorrectly viewed as the art of coaching. More important should be how coaches develop knowledge, how they access that knowledge at the appropriate times and how this affects their decision-making process. (Nash & Collins, 2006). In order to provide an adequate education, a skiing instructor or coach must possess a great range of skiing knowledge and skills. Experts from different skiing nations have previously attempted to represent the ski skill development process and define the different concepts, specific classifications, and teaching models of skiing techniques in contemporary skiing schools programmes, often with dissimilar outcomes (e.g., Matković et al., 2004; Fry, 2006; Murovec, 2006; Anderson, 2007; Lešnik & Žvan, 2010). For the most part these perspectives focus on a 'one size fits all' notion of learning to ski where techniques are the focus and learners adapt to the technique. The current focus on technique has meant that different countries and ski schools have adopted distinctive technique-based teaching programs under the assumption that a specific technique developed is the most effective. We sampled the ideas of the ski coaches from different

countries to ascertain how the basic turn was taught to learners. Several studies dealing with the formation of expert models for training alpine skiers and the hierarchical classification of the said (Kuna, 2014., 2015). Following the said statements related to the formation of an expert model for training alpine skiers, there emerged the need for further methodical presumptions, from which arose the main objective of this study, which is the formation of an expert model of the most important methodical exercises for correcting the error which most interferes with performing snow plow bow turn.

Methods

The respondent sample consisted of 20 national demonstrators aged 25 to 45. Among these, there were 8 Croatian, 6 Slovenian, and 6 Bosnian national demonstrators selected as the top skiing experts on the basis of their skiing knowledge, and they voluntarily agreed to take part in the study. Through email correspondence between the paper authors, the experts first defined the most common errors in performing snow plow bow turn and then, on a scale from 1 to 3 (1- smallest error, 2 – medium error, 3 – great error), selected the three errors which most disrupts proper performance of the snow plow bow turn. Following this, the experts defined a methodical model of the exercises for correcting the error which most disrupts proper performance of the snow plow bow turn and, on a scale from 1 to 5, graded these 5 methodical exercises based on their significance in the correction of this error. The experts assigned the methodical exercises one of the following values: 1 – very small significance, 2 – small significance, 3 – medium significance, 4 – high significance, and 5 – very high significance.

The expert model of typical errors encompassed five mistakes, namely: IPS (improper position of ski), FTUT (forced turn using the torso), LB (leaning back), ISM (insufficient skiing motion), TGBT (too great bend of the torso). Three errors recognized as the ones that most interfere with skiers' performance of the snow plow bow turn were: LB (leaning back), FTUT (forced turn using the torso) and ISM (insufficient skiing motion). For LB (leaning back), the experts, again using e-mail and coordinated by the paper author, defined the methodical model of the exercises for its correction. Samples of variables for the most important methodical exercise of error LB (leaning back), which most interferes with performing the snow plow bow turn, included twelve methodical exercises: SPAI (snow plow bow turn by bird imitations), SPBVM (snow plow bow turn with vertical movement in the downhill sloping), BHEK (both hands on the external knee), STAI (snow plow turn by air plane imitations), AFKB (arms folded in sloping skirts and knees in the turn), OAHS (open arms by holding sticks following the direction of movement), STIFB (snow plow bow with inner arm in front of body), SPFB (ski poles in front of body), SPOS (ski poles on the shoulders), SPOS (ski poles behind the back), ARTUS (alternately lifting the tail of the upper skis with the sticks in front of the body), IAFND (inner arm by holding stick in front of the neck while another following the direction of movement). In accordance with the objective set in this study, i.e. forming an expert model of the most significant methodical exercises for the correction of error that most interferes with performing the snow plow bow turn, a nonparametric chi-square test ($\chi 2$) was used. We tested the statistical significance of the differences (p) in the frequency of the expert evaluation of three errors that most interfere with its proper performance, and in the evaluation of five methodical exercises which in the formed expert model have the highest significance in the correction of LB (leaning back) error.

Results and discussion

Based on the obtained values of testing the frequency of expert evaluation of three errors that most disrupts proper performance of the snow plow bow turn, it was observed that there was no statistically significant difference between them (*Table 1*).

Table 1 Evaluation of three errors that most disrupts proper performance of the snow plow bow turn. The observed frequency of an expert evaluation of the most common errors (OF), the expected frequency of the expert evaluation of the most interference errors (EF), the value of chi-square test ($\chi 2$) and the corresponding level of significance (p).

Expert model of the typical errors of snow plow bow	OF	EF
IPS	11	12
FTUT	15	12
LB	17	12
ISM	13	12
TGBT	4	12
$\chi 2 = 8.33$ p = 0.08		

In the expert evaluation, *LB* error has the highest frequency of occurrence in performance of the snow plow bow. A large number of skiing beginners, due to both fear and their desire to gain control over the speed of the skis when moving downhill, shift the centre of the gravity of their body backwards (Kuna, 2017). Due to insufficient movements forwards and towards the centre of the turn, the skier's body lags behind the skis which starts accelerating when moving downhill and it most often results in uncontrolled changes in the movement direction and in losing the balance position when performing the snow plow bow. Losing control over the speed and movement direction are probably the main reason for the highest frequency of the said error in the expert evaluation. The second most frequent error, typical when performing the snow plow turn is the *FTUT*

(forced turn using the torso) where the skier, by tilting their torso towards the slope, defies establishing the balance on the outside ski, leading to an uncoordinated work of the upper and the lower body parts and, due to placing a great load on the inside ski, slides off in the turn. The third most frequent error is *PKF (passive knee function)* error, or insufficient circular motion of the knees, causing the skier to slide uncontrollably and to fail to complete the turn perpendicular to the fall line. In *Table 2* there is expert model and evaluation of the most efficiency methodical exercises for correcting the *LB* error typical of performing snow plow bow turn. Based on the obtained values of the chi-square test ($\chi 2$) and the corresponding level of significance (p), there was statistically significant difference between them ($\chi 2 = 22$; $p = 0.02$).

Table 2 Evaluation of the most efficient methodical exercises for correcting LB error, typical for performing the snow plow bow turn. The observed frequency of an expert evaluation of the most efficient methodical exercises (OF), the expected frequency of efficient methodical exercises (EF), the value of chi-square test ($\chi 2$) and the corresponding level of significance (p).

Methodical exercises for correcting the *LB* error	OF	EF
SPOS	6	5
SPBVM	2	5
STAI	8	5
SPAI	5	5
AFKB	9	5
OAHS	3	5
STIFB	4	5
SPFB	11	5
BHEK	4	5
SPOS	1	5
ARTUS	6	5
IAFND	1	5
$\chi 2 = 22$		

By analysing the results obtained by forming the expert model of the most effective exercises for correcting the typical *LB* error for performing the snow plow bow turn, it can be observed that *SPFB (ski poles in front of body)* exercises has the highest efficiency in correcting the typical *LB* error. This is an exercise that has multiple values in correcting various errors. A skier learns the snow plow bow turn by holding the ski poles perpendicularly in extension. The skier focuses on establishing the central position on skis more easily, developing a sense of regular skis pressure control and coordination of skiing movement. The second exercise which has the highest efficiency in correcting the said error is *AFKT (arms folded in sloping skirts and knees in the turn).* The snow plow turn with this methodical exercise was performed in the way that skier puts his open arms in the downhill sloping and into the snow plow bow turn phases fists them on the knees and moves them in all snow plow turn performing phases. Circular ski knee motion during the snowplough turn performance are the key factors for overcoming and effective snow plow turn performance, what might be a major reason for high evaluation of this exercise. The third most important exercise in correcting *LB* error is *STAI (snow plow bow turn by air plane imitations).* During the downhill sloping, the skier lowers his outer arm towards the ski, while the inner arm is being lifted up. The high value of this methodological exercise is due to better achievement of balance and pressure on the outer ski during performance of turn towards the hill, which facilitates obtaining a plow position and passing into the new turn. Fourth most important exercises are *SPOS (ski poles behind the back)* and *IRTUS (interchangeably lifting the tail end of the upper skis with the sticks in front of the body). Ski poles behind the back* has been performed with the ski poles on the shoulders where the skier gradually loads next external ski with concurrently circular ski knee moving and external shoulder at the same time. After passing the fall line and the plough, the finishing skier transfers body weight on internal, next external ski, and repeats the same task on the other side. *Interchangeably lifting the tail end of the upper skis with the sticks in front of the body*, the skier holds a dominant load on the outside ski, while holding the sticks in front of the body to establishing the central position on the skis which might be a major reason for high evaluation of this exercise.

In addition to the exercises singled out, it can be said that all the other exercises defined by the expert model of the most effective exercises for correcting typical errors also have a very important function in all aspects of the methodical presumptions of performing the snow plow bow turn. The integration of experiential knowledge of expert coaches with theoretically driven empirical knowledge represents a promising avenue to drive future applied science research and pedagogical practice (Greenwood et al., 2014). Despite the adoption of key aspects of representative design in practice (predominantly through striving for ecological validity), a principled theoretical analysis has yet to be articulated in detail to guide research and practice in sport psychology and sport science (Pinder et al., 2011). Related to above, this study highlights opportunities for further empirical investigation as potential constraints of alpine skiing methodological settings.

Conclusion

The general review of the obtained results for the conducted research, with the aim of forming an expert model of the most significant methodical exercises for the correction of error that most interferes with performing the snow plow bow turn, leads towards the conclusion that the obtained expertise generally enables a relatively higher quality of alpine skiers teaching process planning. In practical application, they should ensure the

valuable information and methodical instructions for teaching the snow plow bow turn to skiing instructors of various expertise levels.

The obtained data have an exceptional significance and make for a unique structure of the methodical programme for teaching the snow plow bow turn. To define with certainty which typical errors are the greatest and which methodical exercises are most effective for their correction, it is necessary to implement in the future an empirical verification in situational conditions on different aged students of skiing schools. The skiing instructors must know which features and characteristics are vital to skiing performance and what their order of importance is, i.e. what weight of influence each methodical elements and methodical exercises for their teaching carries. Only then does the knowledge of developing and modulating individual dimensions become meaningful and useful.

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METODIČKI MODEL KOREKCIJE KARAKTERISTIČNE POGREŠKE SKIJAŠKOG PLUŽNOG LUKA

Sažetak

Ekspertno znanje i iskustvo od krucijalne je važnosti u oblikovanju modaliteta procesa poduke alpskih skijaša. U alpskom skijanju nema dovoljno istraživanja vezanih uz integraciju teorijskih postavki korekcija karakterističnih pogreški koje se javljaju prilikom usvajanja skijaških izvedbi. Cilj ovog istraživanja je bio formiranje ekspertnog modela najvažnijih metodičkih vježbi za ispravljanje pogreške koja najviše narušava izvedbu skijaškog plužnog luka. Uzorak ispitanika je činilo 20 državnih demonstratora. Eksperti su definirali karakteristične pogreške koje se najčešće javljaju tijekom izvedbe skijaškog plužnog luka, a nakon toga na skali od 1 do 3 razvrstali tri pogreške koje najviše narušavaju njegovu pravilnu izvedbu. Slijedom toga su definirali metodički model vježbi za korekciju pogreške NNPL (naginjanje nazad), koja najviše narušava pravilnu izvedbu plužnog luka, te na skali od 1 do 5 vrednovali metodske vježbe za njenu korekciju. U skladu s postavljenim ciljem istraživanja, korišten je neparametrijski Hi – kvadrat test ($\chi 2$). Testirana je statistička značajnost razlika (p) između frekvencije ekspertnog vrednovanja 3 pogreške koje najviše narušavaju njegovu pravilnu izvedbu, te u vrednovanju 5 metodičkih vježbi koje od formiranog ekspertnog modela za korekciju pogreške NNPL, imaju najveću vrijednost. Na temelju dobivenih vrijednosti rezultata u ispitivanju razlike frekvencije ekspertnog vrednovanja triju pogreški koje najviše narušavaju pravilnu izvedbu plužnog luka, nisu dobivene statistički značajne ($\chi 2 = 8.33$; $p=0.08$), ali su se utvrdile statistički značajne razlike među frekvencijama ekspertnog vrednovanja učinkovitosti vježbi za korekciju pogreške NNPL ($\chi 2 = 22$; $p = 0.02$). Dobiveni podaci imaju izuzetan značaj i čine jedinstvenu strukturu metodičkog programa u poduci plužnog luka. U praktičnoj primjeni, dobiveni rezultati bi trebali osigurati vrijedne informacije i metodičke upute za podučavanje plužnog luka skijaškim stručnjacima različitih stupnjeva izobrazbe.

Ključne riječi: *Ekspertni model, alpsko skijanje, metodičke vježbe, osnovna škola skijanja.*

Received: July 29, 2017
Accepted: August 16, 2017
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