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## ORIGINAL ARTICLES. SPORT

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### Interactive tools for theoretical training of kayakers and canoeists aged 13-16

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#### Abstract

**Purpose:** substantiation and development of the structure and content of theoretical training of kayakers and canoeists at the stage of preliminary basic training and determining the effectiveness of classes using traditional and author's (interactive) means of theoretical training of athletes.

**Material and methods.** In the second stage, an experiment was conducted to establish the effectiveness of traditional and interactive means of theoretical training. The study involved trainers-teachers, a total of 82 people. Among the respondents were 41 coaches of the highest category (21 of them - Honored Coach of Ukraine), 19 people - coaches of the first category, 22 people - coaches of the second category. In the second stage, an experiment was conducted to establish the effectiveness of traditional and interactive means of theoretical training. The experiment involved kayakers and canoeists aged 13-16, who were engaged in the stage of preliminary basic training. The total number of athletes was 42 people. Two experimental groups were formed, in the preparation of which different methods and means of theoretical training were used. Comparison of data obtained during the survey of trainers-teachers was tested for the normality of the distribution using the criterion of agreement  $\chi^2$  Pearson. To determine the reliability of the differences between the indicators of the level of theoretical training of rowers before and after the pedagogical experiment, the criterion of signs (Signtest) was used.

**Results.** Training sessions on the developed program with the use of author's interactive means of theoretical training contributed to a significant ( $p < 0.05$ ) increase in the overall level of theoretical training of rowers at the stage of preliminary basic training by 29.56%. At the same time, training sessions with the use of theoretical training provided by the state curriculum were less effective and contributed to increasing the overall level of theoretical training of young rowers by only 7.2% ( $p < 0.05$ ).

**Conclusions.** Theoretical training is an important component in the system of training kayakers and canoeists. The use of interactive theoretical training tools using the game method (computer games) in the process of theoretical training significantly increases its effectiveness, in contrast to classes that used only traditional tools and methods (study of methodological literature, conversations, demonstration of posters, stands, educational films). This innovative approach makes the process of theoretical training much more effective by providing a higher level of theoretical training of athletes.

**Keywords:** structure and content, interactive tools, game method



### Анотація

**Вікторія Богуславська, Вячеслав Мірошніченко, Сергій Драчук, Володимир Яковлів, Тамара Чернишенко. Інтерактивні засоби для теоретичної підготовки байдарочників та каноїстів 13-16 років.**

**Мета:** обґрунтування та розробка структури та змісту теоретичної підготовки веслувальників на байдарках і каное на етапі попередньої базової підготовки та визначення ефективності занять із застосуванням традиційних та авторських (інтерактивних) засобів теоретичної підготовки спортсменів.

**Матеріал і методи.** На другому етапі з метою встановлення ефективності традиційних та інтерактивних засобів теоретичної підготовки проведено експеримент. В дослідженні взяли участь тренери-викладачі, загальною кількістю 82 особи. Серед опитаних було 41 тренер вищої категорії (з них – 21 заслужений тренер України), 19 осіб – тренери першої категорії, 22 особи – тренери другої категорії. На другому етапі з метою встановлення ефективності традиційних та інтерактивних засобів теоретичної підготовки проведено експеримент. У експерименті взяли участь веслувальники на байдарках і каное віком 13–16 років, які займалися на етапі попередньої базової підготовки. Загальна кількість спортсменів становила 42 особи. Було сформовано дві експериментальні групи, у підготовці яких застосовували різні методи і засоби теоретичної підготовки. Порівняння даних, отриманих під час анкетування тренерів-викладачів, перевірено на нормальність розподілу за допомогою критерію згоди  $\chi^2$  Пірсона. Для визначення достовірності відмінностей між показниками рівня теоретичної підготовленості веслувальників до і після педагогічного експерименту використовувався критерій знаків (Signtest).

**Результати.** Навчально-тренувальні заняття за розробленою програмою із застосуванням авторських інтерактивних засобів теоретичної підготовки сприяли достовірному ( $p < 0,05$ ) підвищенню загального рівня теоретичної підготовленості веслувальників на етапі попередньої базової підготовки на 29,56%. Водночас навчально-тренувальні заняття із застосуванням засобів теоретичної підготовки, що передбачені державною навчальною програмою, виявилися менш ефективними та сприяли підвищенню загального рівня теоретичної підготовленості юних веслувальників лише на 7,2% ( $p < 0,05$ ).

**Висновки.** Теоретична підготовка є важливим компонентом у системі підготовки веслувальників на байдарках і каное. Використання інтерактивних засобів теоретичної підготовки із застосуванням ігрового методу (комп'ютерних ігор) у процесі теоретичної підготовки значно підвищує її ефективність, на відміну від занять на яких застосовували лише традиційні засоби і методи (вивчення методичної літератури, бесіди, демонстрація плакатів, стендів, навчальних фільмів). Такий інноваційний підхід робить процес теоретичної підготовки значно ефективнішим забезпечуючи більш високий рівень теоретичної підготовленості спортсменів.

**Ключові слова:** структура і зміст, інтерактивні засоби, ігровий метод

### Аннотация

**Виктория Богуславская, Вячеслав Мирошниченко, Сергей Драчук, Владимир Яковлев, Тамара Чернышенко. Интерактивные средства для теоретической подготовки байдарочников и каноистов 13-16 лет.**

**Цель:** обоснование и разработка структуры и содержания теоретической подготовки гребцов на байдарках и каное на этапе предварительной базовой подготовки и определения эффективности занятий с применением традиционных и авторских (интерактивных) средств теоретической подготовки спортсменов.

**Материал и методы.** На втором этапе для установления эффективности традиционных и интерактивных средств теоретической подготовки проведен эксперимент. В исследовании приняли участие тренеры-преподаватели, общим количеством 82 человека. Среди опрошенных был 41 тренер высшей категории (из них – 21 заслуженный тренер Украины), 19 – тренеры первой категории, 22 – тренеры второй категории. На втором этапе для установления эффективности традиционных и интерактивных средств теоретической подготовки проведен эксперимент. В эксперименте приняли участие гребцы на байдарках и каное в возрасте 13–16 лет, которые занимались на этапе предварительной базовой подготовки. Общее количество спортсменов составило 42 человека. Были сформированы две экспериментальные группы, в подготовке которых применяли различные методы и средства теоретической подготовки.

Сравнение данных, полученных при анкетировании тренеров-преподавателей, проверено на нормальность распределения с помощью критерия согласия  $\chi^2$  Пирсона. Для определения достоверности отличий между показателями уровня теоретической подготовленности гребцов до и после педагогического эксперимента использовался критерий знаков (Signtest).

**Результаты.** Учебно-тренировочные занятия по разработанной программе с применением авторских интерактивных средств теоретической подготовки способствовали достоверному ( $p < 0,05$ ) повышению общего уровня теоретической подготовленности гребцов на этапе предварительной базовой подготовки на 29,56%. В то же время учебно-тренировочные занятия с применением средств теоретической подготовки, предусмотренные государственной учебной программой, оказали менее эффективными и способствовали повышению общего уровня теоретической подготовленности юных гребцов только на 7,2% ( $p < 0,05$ ).

**Выводы.** Теоретическая подготовка является важным компонентом в системе подготовки гребцов на байдарках и каное. Использование интерактивных средств теоретической подготовки с применением игрового метода (компьютерных игр) в процессе теоретической подготовки значительно повышает ее эффективность, в отличие от занятий, на которых применяли только традиционные средства и методы (изучение методической литературы, беседы, демонстрация плакатов, стендов, обучающих фильмов). Такой инновационный подход делает процесс теоретической подготовки более эффективным, обеспечивая более высокий уровень теоретической подготовленности спортсменов.

**Ключевые слова:** структура и содержание, интерактивные средства, игровой метод



## Introduction

Today, theoretical training is an integral part of the system of training athletes at all stages of long-term sports development [1, 2, 3].

The need to improve theoretical training is due to the growing globalization and professionalization of various groups of sports. This causes the need for athletes to understand the essence of sports, its role in influencing socio-economic and political relations in society, which significantly increases motivation for sports and inevitably leads to increased skills of athletes [4].

However, only some issues of theoretical training of athletes are considered in some works [5]. In addition, there are no disciplines in the curricula of higher education institutions, the purpose of which would be to create a future idea of the system of knowledge of athletes of different qualifications [6, 7, 8, 9, 10].

The substantiation of the general concept of theoretical training in sports revealed by the literary sources of MP Pitin (2015) did not provide for the specification according to the groups of sports [2, 11].

We believe that the theoretical training in kayaking and canoeing should be modern, in accordance with the trends of the sport, to meet the characteristics of the structure and content of training and competitive activities.

Thus, we have identified a scientific and applied problem of theoretical training in kayaking and canoeing, determined by the contradictions between:

- proven need for theoretical training and the lack of relevant components in the software and regulations.
- general requirements for monitoring the level of training of athletes and the lack of objective criteria for theoretical training of rowers.

Hypothesis. We suggested that the use of interactive theoretical training tools using the game method will effectively affect the level of theoretical training of kayakers and canoeists at the stage of preliminary basic training.

**The purpose of the work** is to substantiate and develop the structure and content of theoretical training of kayakers and canoeists at the stage of preliminary basic training and determine the effectiveness of classes using traditional and author's (interactive) means of theoretical training of athletes.

## Material and methods

### Participants

At the first stage, in order to determine topical issues of theoretical training of athletes, a survey of coaches was conducted. Coaches-teachers took part in the survey. The total number of respondents is 82 people. Among the respondents are 41 coaches of the highest category, including 21 honored coaches of Ukraine, 19 people - coaches of the first category and 22 people - coaches of the second category.

In the second stage, an experiment was conducted to establish the effectiveness of traditional and interactive means of theoretical training. It was attended by kayakers and canoeists aged 13-16, who were engaged in the stage of preliminary basic training. The total number of athletes was 42 people. They formed two groups. The first group consisted of 20 people, and the second - 22 people. All participants voluntarily agreed to participate in the study.

### Procedure (organization of research)

The analysis and generalization of data from scientific and methodological literature and Internet content was aimed at identifying problems and contradictions related to the theoretical training in kayaking and canoeing. The integration of the latest scientific achievements into the system of training athletes was clarified.

The analysis of documentary materials (training programs for athletes) determined the existing structure and content of theoretical training in rowing and made it possible to determine the extent to which theoretical training is provided at the legislative level.

A sociological survey was conducted among trainers to determine the priority of information sources in providing athletes with information, the feasibility of using various tools and methods of theoretical training, the importance of sections and topics of theoretical training, the effectiveness of forms of training and control over the level of theoretical training of athletes. basic training.

According to the results of the questionnaire, an author's program for theoretical training of kayakers and canoeists for the stage of preliminary basic training with an improved structure and content was created. Author's interactive means of theoretical training have been developed. Namely, sixteen computer games: "Quiz on the history of rowing as a sport", "Who is depicted in the photo?", "Sports

terminology", "Major errors in rowing technique", "Features of physical training of rowers", "If tired - rest", "Victory lies in the rules", "Medical control and self-control", "The impact of exercise on the athlete's body", "Do you want to be healthy - harden", "Do you know how to eat?", "Friends with your

boat", "Be careful on the water!", "When do injuries occur?", "Rules of conduct during competitions", "Assistance to the victim" (<http://bohuslavaska.com>) (Fig. 2) [12].



Fig. 1. Interactive means of theoretical training of kayakers and canoeists at the stage of preliminary basic training

The program was implemented in the training process during the preparatory period of the annual macrocycle (only 30 hours). At the stage of preliminary basic training it lasts seven months (from October to April).

At the stage of the observational experiment, before the beginning of classes according to the author's program, the level of theoretical readiness of athletes was determined by testing.

At the stage of the formative experiment the influence of the developed program and author's interactive means on the level of theoretical readiness of the same contingent of rowers was studied. For this purpose, at the end of the stage, the final control testing of the level of theoretical training of athletes was carried out.

The program of theoretical training in a pedagogical experiment consisted of eight sections. Thus, the section "History of the sport" includes three topics: "Rowing at the Olympic Games", "Performances of Ukrainian rowers at the Olympic Games", "Outstanding athletes and coaches". The section "Humanitarian and socializing knowledge in the training of athletes" is presented by the topic:

"Sports terminology". According to the section "Content of sports training" the most popular topics were: "Formation of knowledge about the technique of sport" and "Formation of knowledge about the features of physical training of athletes." The section "General basics of training athletes" is presented on the topic: "Fatigue and recovery". The section "Competitive activity" is presented by the theme: "Rules and refereeing of sports competitions". The section "Medical and biological bases of sports training" is presented by four topics: "Medical control and self-control", "Hygiene, hardening, mode", "Influence of physical exercises on the athlete's body", "Features of athletes' nutrition". The section "Logistics" offers three topics for study: "Sports equipment. Rules of storage and operation", "Requirements for training venues and competitions" and "Athlete's equipment". The section "Safety rules" is presented by four topics: "Rules of conduct during training and competitions", "First aid", "Safety and emergency procedures" and "Injuries in sports". Causes and prevention (Fig. 2).

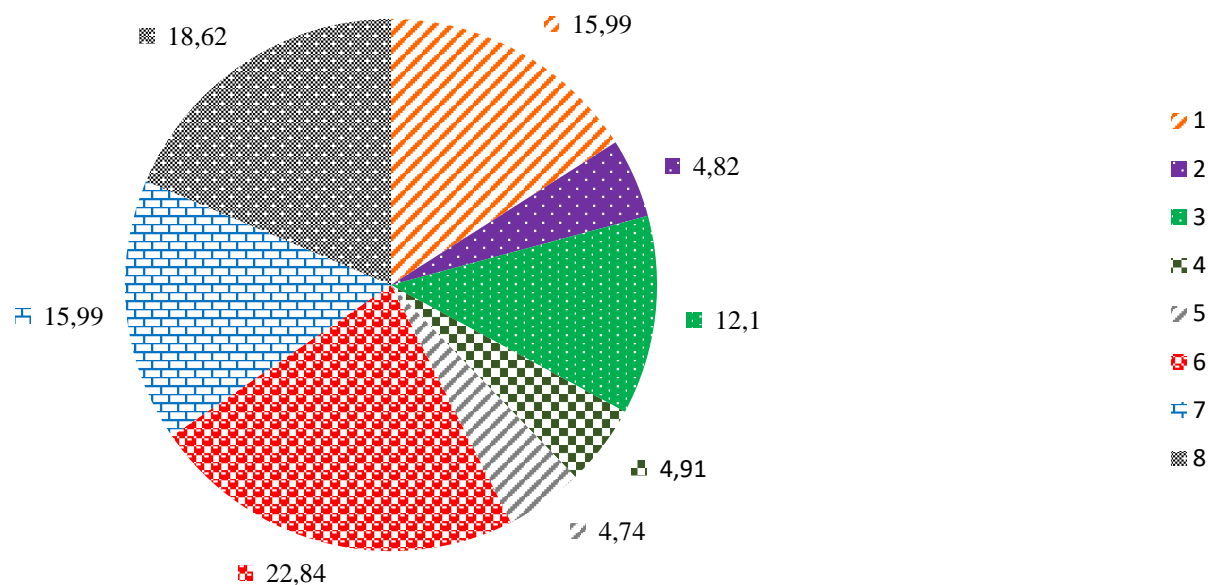


Fig. 2. Percentage of hours allocated for consideration of separate sections of theoretical training at the stage of preliminary basic training (according to the results of the survey of trainers-teachers, n = 82):

- 1 – History of your sport
- 2 – Humanitarian and socializing knowledge in the training of athletes
- 3 – The content of sports training
- 4 – General basics of training athletes
- 5 – General activities
- 6 – Medical and biological bases of sports training
- 7 – Logistics
- 8 – Safety rules

For athletes of both experimental groups, the content of theoretical classes was the same. The difference between the groups was the use of tools and methods. The first group used only those tools and methods that are recommended by the state curriculum (study of methodological literature, conversations, demonstration of posters, stands, educational films) [13]. While in the educational and training process of the athletes of the second group, the author's interactive tools were introduced, namely sixteen computer games on the topics of the sections of theoretical training.

The use of author's interactive tools took place according to the following algorithm:

- 1) preliminary conversation (story) with athletes on the topic of the lesson;
- 2) acquaintance of athletes with the content of the game;
- 3) placement of each of the players on a separate PC (laptop);
- 4) providing assistance (if necessary) to athletes during the game;
- 5) determining the winner by a set of factors (speed of solving the problem, the number of mistakes);

6) analysis and discussion of the results of the game, indicating the advantages and disadvantages of the participants.

For both groups, the duration of the theoretical training load was one academic hour per week. The total duration of theoretical training was 30 weeks.

Statistical analysis:

The comparison of data obtained during the survey of trainers-teachers was tested for the normality of the distribution using the criterion of agreement  $\chi^2$  (chi-square) Pearson.

Determination of the level of theoretical training of rowers was carried out in points (from 0 to 30).

Establishing the reliability of differences between indicators of the level of theoretical readiness of rowers before and after the pedagogical experiment (1st and 2nd sections of testing) was implemented using the criterion of signs (Signtest). This non-parametric criterion was used because the results obtained during the study are not subject to the law of normal distribution. Statistica 13 was used to process the results of the study.

Results.

Analysis of the state curriculum for kayaking and canoeing [13] revealed some inconsistencies.



Thus, with each subsequent year of training of rowers there is a decrease in the load of theoretical training (from 4.81% to 3.21%) relative to the total number of hours devoted to the training process in the macrocycle.

In addition, the curricula revealed duplication of many topics of information material at different stages of long-term improvement of athletes.

In our opinion, this impoverishes the information material and unilaterally forms the special knowledge of rowers.

In order to solve the established problems, the attitude of coaches-teachers to the topical issues of theoretical training of athletes was clarified. For this purpose, a survey of specialists (n = 82) was conducted through questionnaires.

According to the results of the questionnaire, it was established which topics coaches-teachers recommend to include in the program material for training athletes at each stage of long-term improvement. The verification of the answers to the questionnaires on the normality of the distribution using the Pearson consistency criterion found that the level of reliability from  $p = 0.027$  ( $p < 0.05$ ) to  $p = 6.61 \cdot 10^{-25}$  ( $p < 0.05$ ).

According to the trainers, at the stage of preliminary basic training it is unanimous to give priority in the application of the game method of theoretical training (96.34%). The level of reliability of the obtained data on the normality of the distribution using the Pearson consistency criterion ranges from  $p = 0.13$  ( $p < 0.05$ ) to  $p = 1.18 \cdot 10^{-29}$  ( $p < 0.05$ ).

The generalization of the results of the answers of trainers-teachers regarding the expediency of using various means of theoretical training at the stage of preliminary basic training

showed the need to use technical teaching aids (81.71%). The established level of reliability of the study results is in the range from  $p = 0.019$  ( $p < 0.05$ ) to  $p = 2.32 \cdot 10^{-29}$  ( $p < 0.05$ ).

The survey provided an opportunity to identify the topics of theoretical training of kayakers and canoeists who train at the stage of preliminary basic training, to fill in the content of each topic, to develop and implement a program of formative experiment.

As a result of the conducted pedagogical experiment the insufficient efficiency of assimilation of information by rowers on all sections of theoretical preparation where only the means recommended by the state educational program were applied is established. Although a tendency to its growth has been established, which has contributed to a statistically significant increase in the general level of theoretical training. Thus, at the beginning of the study, the average assessment of the level of knowledge of athletes was  $8.7 \pm 0.61$  points, at the end -  $10.85 \pm 0.61$  points (maximum number of points - 30). At the same time, in percentage terms, this indicator improved by 7.2% ( $p < 0.05$ ).

In contrast, classes in which, in addition to the curriculum provided, interactive theoretical training tools were used using game and competitive methods, contributed to a likely increase in the average assessment of the level of theoretical training of athletes in each section of the program. This is evidenced by a much higher degree of growth of average scores from  $9.27 \pm 0.51$  points at the beginning of the experiment and up to  $18.14 \pm 0.8$  points (maximum number of points - 30) in the final testing. This percentage difference is equal to 29.56% ( $p < 0.05$ ) (Table 1).

Table 1

The level of education of kayakers and canoeists in theoretical training at the stage of preliminary basic training in the preparatory period of the annual macrocycle

Knowledge section	Experimental group, during the preparation of which only the means recommended by the state curriculum were used.				Experimental group, during the preparation of which interactive means of theoretical training with the use of game and competitive methods were used			
	Before classes	In 30 weeks	Significance level		Before classes	In 30 weeks	Significance level	
	X ± S	X ± S	Z	p-level	X ± S	X ± S	Z	p-level
History of kayaking and canoeing as a sport	1.30±0.184	1.75±0.184	1.581	0.114	1.45±0.171	2.41±0.171	2.750	0.005*
Humanitarian and socializing knowledge in the training of athletes	1.15±0.123	1.30±0.123	1.500	0.134	0.91±0.114	1.73±0.171	3.328	0.000*



The content of sports training	0.85±0.123	1.00±0.123	0.316	0.752	1.00±0.114	2.18±0.114	3.474	0.000*
General basics of training athletes	0.40±0.062	0.65±0.123	0.756	0.450	0.55±0.057	1.36±0.057	3.328	0.000*
Competitive activity	0.75±0.062	1.00±0.123	1.512	0.131	0.68±0.114	1.36±0.057	2.774	0.005*
Medical and biological bases of sports training	1.65±0.184	2.00±0.246	1.443	0.149	1.77±0.114	3.63±0.229	3.750	0.000*
Logistics	0.60±0.062	0.65±0.123	0.289	0.773	0.55±0.057	1.45±0.057	3.175	0.001*
Safety rules	2.00±0.123	2.50±0.246	1.443	0.149	2.14±0.114	4.59±0.229	3.881	0.000*

Note. Probability of difference of indicators concerning initial data: \* -  $p < 0.05$

## Discussion

The results of our research confirm the data of other authors, who emphasize that theoretical training in cyclical sports is given insufficient attention [2, 14, 15, 16].

In addition, the coaches we interviewed confirm the opinion of a large number of scientists who point out the inconsistency of software and methodological support of the training process of young athletes to modern requirements for sports training [1, 17].

Thus, as a result of our research, we further developed information about the importance of theoretical training in sports as a factor in the socialization of the athlete and the indirect conditions for achieving results in training and competitive activities in kayaking and canoeing [3, 4, 18].

The content of implementation provisions of theoretical training in sports has been improved.

We rely on available scientific approaches to methods, tools and forms of control. They are specified in accordance with the requirements of theoretical training of kayakers and canoeists at the stage of preliminary basic training.

In this regard, the game method chosen by the coaches-teachers for this stage of preparation was borrowed by M.P. Pitin (2015) [2, 11] on practical activities in sports. This method makes it possible to simultaneously affect several senses, ie able to develop polysensitivity in athletes. And the interactive methods of theoretical training substantiated by the author stimulate the athlete's desire to find answers to questions or ways to solve problems that arise in the process of sports training.

The use of theoretical training methods in the educational process is possible due to specific means of theoretical training.

However, we did not find any information on testing the effectiveness of theoretical training on the example of kayaking and canoeing. However, the effectiveness of some theoretical training tools has been experimentally tested and proven on the example of such sports (groups of sports) as martial

arts [5, 20, 21], athletics (16), cycling [15], sports games [6, 19].

The expediency and effectiveness of the use of tools and methods of theoretical training in the training process is carried out by checking the level of knowledge of athletes.

We have improved the requirements for the knowledge system of kayakers and canoeists at the stage of preliminary basic training. To this end, the opinions of the trainer-teachers were clarified. Among them, most respondents insist on testing as a form of staged control of the level of theoretical training of rowers at this stage of long-term sports improvement. This confirms the opinion of other authors who consider pedagogical testing to be the most standardized method of control and evaluation of knowledge, skills and abilities of the subjects [2, 5].

As a result of the study, the structure and content of the system of theoretical training of rowers at the stage of preliminary basic training were substantiated for the first time. This was done taking into account the fundamental scientific principles of the general theory of training athletes [3] and the results of a previous survey of trainers-teachers [1, 17].

Thirteen topics are proposed for consideration at this stage of preparation by the state curriculum, the effectiveness of seven of which is confirmed by the results of a survey of trainers-teachers. At the same time, the necessity of introducing eleven topics that are not presented in the curriculum into the theoretical training of athletes was confirmed.

## Conclusions

Theoretical training is an important component in the system of training kayakers and canoeists. The use of interactive theoretical training tools using the game method (computer games) in the process of theoretical training significantly increases its effectiveness, in contrast to classes that used only



traditional tools and methods (study of methodological literature, conversations, demonstration of posters, stands, educational films). This innovative approach makes the process of theoretical training much more effective by providing a higher level of theoretical training of athletes.

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## Conflict of interest

The authors state that there is no conflict of interest that could harm the impartiality of the article.

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