

Original Article

The development of coordination skills as the precaution for technical training of canoeists-beginners

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Abstract:

The research is dedicated to the study of the problem of the development of canoeists' coordination skills at the stage of basic training. The results of study of coordination skills of canoeists have been analyzed. The structure of coordination skills of canoeists has been defined. The program of their development at the stage of basic training has been suggested. The object of the investigation is physical training of canoeists-beginners. The subject of the investigation is coordination skills of canoeists. The research aims at the development of the program of improvement of canoeists' coordination skills at the stage of basic training. For achieving the aim of the research work the following tasks have been put: 1. To determine the level of the development and structure of canoeists' coordination skills; 2. To develop evaluation system of the level of the development of coordination skills of canoeists of different training stages; 3. To define facilities and methods of the development of canoeists' coordination skills at the stage of basic training; 4. To find out pedagogical conditions of the realization of the program of improvement of canoeists' coordination skills at the stage of basic training. To solve the tasks we have used such methods of investigation as theoretical analysis and generalization of literary sources; questionnaire survey; pedagogical observations; pedagogical experiment; methods of determination and estimation of the level of the development of canoeists' coordination skills; method of pedagogical control tests (testing); method of expert estimations; methods of mathematical statistics.

Keywords: coordination skills, canoeists-beginners, stage of basic training, general and special coordination skills, structure of coordination skills, pedagogical conditions, facilities, methods.

Introduction

The growth of the sport results level in canoeing and the specialization of young athletes, which provides high achievements in sport on the world stage require the search for new approaches to the process of the canoeists training at the stage of basic training in the long-term system of training the athletes and the creation of preconditions for the successful mastering of canoeing technique. It is only possible to succeed if canoeists reveal a high level of special physical qualities development and are perfectly familiar with canoeing technique as well (A. M. Kandaurov, 1981; A. I. Klimenko, 2010; I. I. Kozetov 2001; O. M. Kolumbet 2014).

The canoeing technique has a complicated structure and demands the demonstration of a high level of development of a number of coordination skills. Particular requirements relate to the ability to maintain a dynamic balance. Maintaining the balance of the body during canoeing is an important complicated element of the technology, which requires: a) body balance in the boat; b) neutralization of the vertical component of the paddle resistance in the water (A. V. Zhirnov, 2007; N. V. Zhmarev, 1981; V. E. Zemljakov, 2001; V Starosta, 2008). In addition, the ability to regulate muscular effort is one of the main criteria in the process of the selection of canoeists (V. P. Ozerov, 2002; O. A. Shinkaruk, 1993).

In the process of canoeists training some specific set of senses are formed, such as a sense of water, a sense of balance, a sense of speed, rhythm and motion. The formation of these specific senses and skills allows the canoeists to study much more effectively and perform movements with minimal energy expenditure (O. A. Shinkaruk, 2000; P. Ladyka, 2006; V. I. Ljah, 2006).

At the same time, not enough studies have been devoted to the problem of coordination skills development of the canoeists-beginners. There is some information on improving the coordination skills of the canoeists mainly on the water without any possibility of its development on the land (A. I. Klimenko, 2010). In addition, these sources mainly provide recommendations on the general coordination development (agility). Other literary sources (N. A. Bernshtejn, 1991; I. Ja. Dem'janov, 2000; V. E. Zemljakov, 2001; A. M. Kandaurov, 1981; I. I. Kozetov, 2001), also do not provide a program on the coordination skills development; there is a lack of methodical advice on the duration of the training loads and rest intervals and the role of individual coordination skills in the training process of the canoeists at the stage of basic training.

So, the scientific and methodological literature devoted to the problem of the athletes coordination skills development, factors that determine its development, mechanisms of coordination skills formation, bases of

diagnostics and coordination skills development, the value of coordination skills in the process of canoeists training have been analyzed. The lack of information regarding the means and methodical techniques of the coordination skills development of the canoeists at the stage of basic training has been revealed.

Thus, on the one hand, the relevance of the research is determined by the importance of improving the canoeist's coordination skills at the stage of basic training for the successful mastering of canoeing technique. On the other hand, the lack of scientific and methodological recommendations, the determined means and methodical methods for the purposeful development of coordination skills of the canoeists at this stage of multi-year training led to the choice of the topic of the dissertation research.

The aim of research is to develop a program of canoeists' coordination skills improvement at the stage of basic training.

According to the goal the following **tasks** have been solved:

1. To determine the level of the development and structure of canoeists coordination skills.
2. To develop an evaluation system of the level of coordination skills improvement of canoeists at different training stages.
3. To define facilities and methods of canoeist's coordination skills development at the stage of basic training.
4. To find out pedagogical conditions of the realization of the program of canoeist's coordination skills improvement at the stage of basic training.

Material and methods

A wide range of research methods such as the theoretical analysis and generalization of literary sources, questionnaire survey, pedagogical observation and experiment, methods of determination and estimation of the level of the canoeists' coordination skills development, methods of pedagogical control tests and expert estimations, methods of mathematical statistics have been used to solve the main tasks of the research.

In the process of the qualifying experiment, the level of coordination skills development of the Ukrainian canoeists and the views of the practitioners on the identified problem has been determined. To determine the level of the coordination skills development of the canoeists, we have tested 32 athletes (8 Masters of Sports of Ukraine and 24 Candidates for Master of Sports of Ukraine) from the age of 17 to 21 years.

Tests were developed to establish that skilled athletes possess such coordination skills as: the ability to maintain a stable posture (21.87% get the level of development above the average and 18.75% acquire a high level of development); the ability to evaluate and regulate the dynamic and spatial-temporal parameters of movements (25% get the level of development above the average and 15.62% acquire a high level of development). A high level of development of the ability to sense the rhythm and the coordination of movements in motor activity was noted in 15.62% of athletes. Other coordination skills (to maintain a stable posture, to arbitrarily relax muscles and the ability in space orientation) are less developed.

A correlation analysis between the results of high-level athletes at covering the distances of 1000 m, 500 m, 200 m and the indicators of coordination skills development have revealed that a strong correlation exists only between the results of covering the distance of 1000 and 500 m and in the ability to maintain the balance ($r = 0.61$ and $r = 0.62$). The average link was found: between the ability to evaluate and adjust to the dynamic and spatial-temporal parameters of movements and the results of covering the all three distances ($r = 0.044$, $r = 0.47$, $r = 0.49$); between the ability to sense the rhythm and the ability to arbitrarily relax muscles and covering a distance of 200 m ($r = 0.45$ and $r = 0.4$) and the ability to coordinate movements in motor activity and results at covering distances of 1000 and 500 m ($r = 0.5$ and $r = 0.54$). In other cases, the relationship between coordination skills and results on covering distances is weak.

The correlation analysis of indicators in tests in order to determine the level of development of certain types of coordination skills and the interdependence between different coordination skills of the canoeists has been performed. Highly skilled canoeists have the ability to evaluate and regulate the dynamic and spatial-temporal parameters of movements with an average ability to maintain a stable posture ($r = 0.40$), to sense the rhythm ($r = 0.46$) and to coordinate movements in motor action ($r = 0.38$). The ability to maintain a stable posture at the medium level correlates with the ability in space orientation ($r = 0.40$), and strongly correlates with the ability to coordinate movements in motor activity ($r = 0.64$). There is no vivid relationship between different coordination skills that can identify the dependence of one coordination skill on others.

To determine the most important coordinating skills of the canoeists, a factor analysis has been conducted. For the factor analysis, indicators ($n = 14$) for the development of coordination skills of high-level canoeists (CMS and MS, $n = 32$) have been used. These data served as the basis for the formation of an experimental program with a focus on a priority development of individual coordination skills in the process of preparation of canoeist's at the stage of basic training. Factor analysis has revealed that the structure of the coordination skills of the canoeists is constructed of five factors. The contribution of the first factor to the total dispersion is 21.3%. This factor includes tests that determine the level of development of the ability to assess and regulate the dynamic and spatial-temporal parameters of the canoeist's movement.

The obtained result confirms the opinion of V. Platonov, concerning the leading role of the ability to evaluate and regulate the dynamic and spatial-temporal parameters of movements in cyclic kinds of sports. Contribution of the second factor (tests to determine the level of development of the ability to sense the rhythm (0.878-0.914) in the total dispersion is 16.5 %. The third factor is constructed of the tests that characterize the ability in space orientation (0.832-0.827); its contribution to the total dispersion is 11.03%.

The percentage of the fourth factor in the total dispersion is 10.15% - it consists of tests that characterize the ability to arbitrarily relax muscles (0.706-0.648). Fifth factor includes the tests that characterize the ability to coordinate motions in motor action; the percentage of this factor in the total dispersion is 9.97%. The results of factor analysis have been the basis for determining the proportion of means to improve each coordination skill.

102 coaches were interviewed to identify the coaches' attitudes toward the influence of coordination skills on the level of the canoeists' athletic achievements. Among them, 4 honored coaches of Ukraine, 32 coaches of the highest category. The majority (67%) of respondents believe that the result in canoeing strongly depends on the level of coordination skills development. Regarding the types of coordination skills on which the result in canoeing depends, the opinions of respondents were divided as follows.

On the first place, the overwhelming majority (53%) of respondents set the ability to coordinate motions in motor activity. The ability to evaluate and adjust the dynamic and spatial-temporal parameters, according to respondents' answers (37%) ranks the second place. The ability to maintain balance 41 % of respondents put on the third place. The majority (47%) of respondents set the ability to arbitrarily relax muscles on the fourth place. The ability to feel the rhythm acquires the fifth place (31%). Regarding the exercises that should be performed before the first training on the water the opinions of respondents have been divided as follows: on the first place, the overwhelming majority (60%) of the coaches suggests exercises on building endurance. After exercises on building endurance, 49% of respondents offer exercises on developing the coordination skills. On the third place most coaches (47%) propose exercises on speed development. After exercises on speed development, most respondents (41%) offer exercises on power development. The last place belongs to exercises on the development of flexibility (58%).

Results

The results of the theoretical research, analysis of documentary sources and the confirmatory experiment have been the basis for the development of the experimental program, its means, methods, methodical techniques and pedagogical conditions for the coordination skills development of canoeists at the stage of basic training. During the implementation of the author's program, the general and special coordination skills and ideomotor training have been used. All exercises used in the process of training of canoeists at the stage of basic training, were divided into two groups: 1) exercises that develop various coordination skills; 2) special focus exercises.

The first group includes running, jumping, walking, various general development exercises, mobile and sports games, exercises of ideomotor character, exercises with hoops, ropes, stuffed balls, tennis, soccer and basketball balls, gymnastic sticks, races. The second group includes exercises performed in conditions very close to paddling, and directly during the canoeing: exercises with a paddle, exercises on a simulator, on a rowing bridge, exercises in a boat. Special focus exercises have been divided into four blocks (fig. 1).

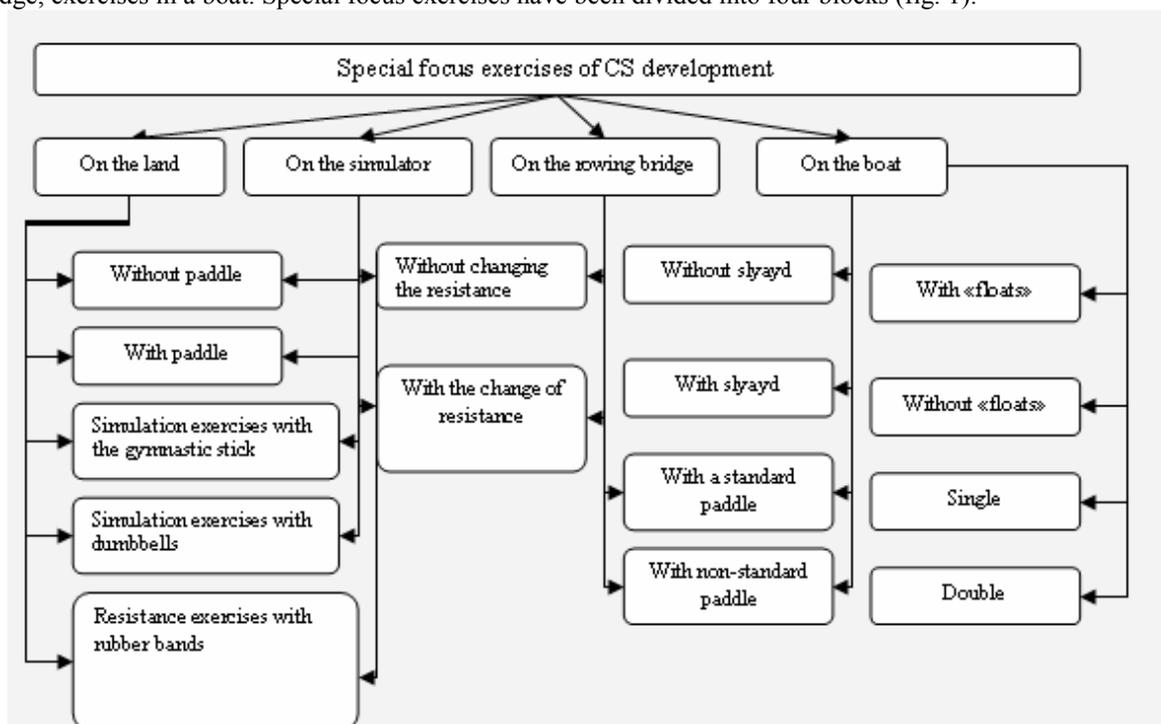


Fig.1 Special focus exercises of coordination skills development of canoeists-beginners

In the process of improving the coordination skills of canoeists-beginners are widely used exercises that set higher requirements to the activity of analyzers for the accuracy of dynamic and spatial-temporal parameters of movements by eliminating or limiting the visual and auditory control of motor actions. Great importance, especially in the improvement of the ability to sense the rhythm was provided by exercises with using light and sound «lidars». In order to improve the development of specific senses and perceptions of canoeists (feeling the water, the boat) the paddles of different sizes, with different size blades, paddles of different weights, paddling on the simulator, on the bridge, paddling in adverse weather conditions during the knocking factors (side wind, wave, strong noise) have been experienced.

In order to successfully improve the coordination skills of canoeists-beginners, the specific principles of sports training have been followed. In the process of selecting the appropriate means the two groups of methodical techniques have been used.

The first group consisted of methods for the development of general coordination skills of canoeists-beginners: the relative novelty of the task; unusual exercises; increasing the coordination complexity of tasks; variety of motor actions and their combinations; frequent change of task execution, dynamic and kinematics characteristics of motion; sudden change of situation; use of unusual starting positions; mirroring performance; change of spatial boundaries within the exercise is performed; change of ways in performing the exercise; complications of the exercise with some additional movements.

The second group is consisted of the following methodical techniques: maximum speed and accuracy during the motor action; change in speed and in pace of movement; restriction or expansion of space for action; performing exercises in a state of fatigue; performing motor exercises in a state of significant emotional stress; performing exercises in the condition of periodical exclusion or limitation of visual control; reduction in muscle tension; application of additional guides and urgent information; the use of specialized dynamic exercises aimed at the development of coordination skills directly in the sport motor skill structure.

Coordinating training of canoeists-beginners underwent three stages. The correlation of means of children's coordination development has been determined depending on the period of canoeist's training. The first stage of training lasted from October to January. At that time, we have improved all the coordination skills of canoeists-beginners. In the second stage (February-April) we have improved the ability to evaluate and regulate the dynamic and spatial-temporal parameters of movements, the ability to maintain the balance, the ability to sense the rhythm and the ability to arbitrarily relax muscles); the ratio of exercises has been 40% : 60% in favor of special coordination skills. During the third stage (May-July) we have provided training in boats.

The ratio of the amount of means has changed in the direction of special coordination skills of the canoeists and became 20%: 80% concordantly, on each separate training.

The effectiveness of the program implementation has been ensured by the appropriate pedagogical conditions of the training process organization, such as: a variety of tools and methodical techniques in the classes which has enriched the motor experience of canoeists-beginners; emotionality in the training process; children's creative approach to their own self-improvement; personal and activity approach to each young athlete.

In order to test the effectiveness of the pilot program, the following criteria have been chosen: the level of coordination skills development of beginners on the land; on the water; an expert assessment of canoeing technique; time covering the distance of 100 and 200 m; the number of turnovers during the canoeing.

At the beginning of the molding experiment no discrepancy between the coordination skills of the canoeists of the control and the experimental groups has been found ($p > 0.05$).

The results of the test before reaching the water has showed that in the experimental group the level of development of the ability to sense the rhythm has increased to 19,83%, the ability to estimate and regulate the dynamic and spatial-temporal parameters of movements has increased to 13,72%. Other abilities have increased from 10.98 to 11.82%.

In the control group, the best growth rates have been found in the ability to coordinate motions in motor activity (4.95%) and the ability to estimate and regulate the dynamic and spatial-temporal parameters of movements (4.46%).

At the end of the experiment (fig. 2), the coordination skills growth rates have improved in 5-10%, the ability in space orientation - 23%, the sense of rhythm - 19%.

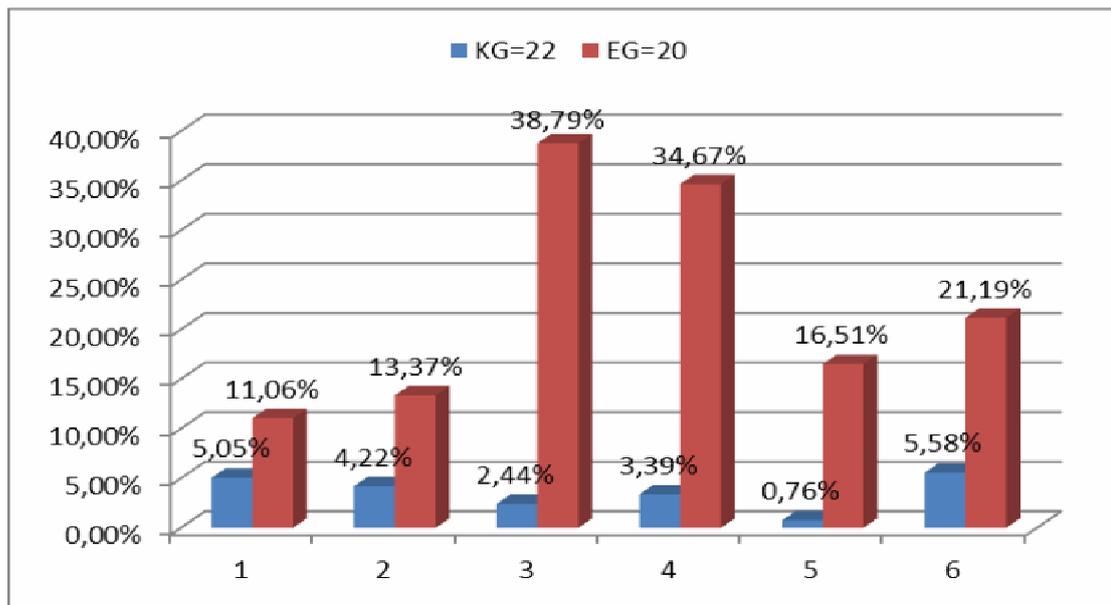


Fig. 2 Coordination skills growth rates of canoeists-beginners at the end of the experiment
 1 - evaluation and regulation of dynamic and spatial-temporal parameters of movement; 2 - maintaining a stable posture; 3 - the sense of rhythm; 4 - orientation in space; 5 - muscle relaxation; 6 - coordination of movements in motor action.

In the control group, the best growth rates have been found in the ability to estimate and control the dynamic and spatial-temporal parameters of movements (5.05%) and in the ability to coordinate the movements in motor action 5.5%.

In the control group, during the training on the water, the initial index of the balance in the boat has been 3.89 ± 0.13 s, in the experimental group -9.43 ± 0.27 s. Thus, the maintenance of the balance of the children of the experimental group have almost in three times exceeded the same rate of athletes of the control group as a result of training on the land.

The average rate of development of the rhythm in the children's control group has been 2.82 ± 0.17 UM, while in the experimental group has been 4.75 ± 0.12 UM. At the end of the pedagogical experiment, the increase in time of maintaining the balance of athletes in the control group has indicated 59.58%, in the experimental group it has improved to 74.93%.

An average rate of development of the ability to sense the rhythm in the control group has increased to 4.48% and in the experimental group to 41.05%.

During the control races in covering the distance of 100 and 200 m, the following results have been obtained: an average time to cover the distance of 100 m in the control group has been 34.91 ± 0.35 s, in the experimental group- 33.29 ± 0.20 s, which is in 1.62 s. faster than in the control group.

When covering a twice longer distance, an average time of its covering in the control group has been 1.14 ± 0.01 s, and in the experimental group - 1.12 ± 0.1 s, which is in 2.09 s faster than in the control group.

It is found out by the experts that in the control group more children are assumed to have errors during the canoeing in comparison with the experimental group. Thus, the most common errors in the first group are (deviation of the blade motion from the optimal trajectory: "unfinished paddling stroke" or the gradual decrease of the blade area before the paddling stroke is performed) are found in 86% of children of the control group and 65% of children of the experimental group.

Mistakes of the second group (non-constant magnitude of the pressure of the paddle in the water during the paddling stroke) have been found out in 90% of children of the control group and in 50% of children of the experimental group. Mistakes of the third group (non use or partial use of the body weight, delay in turning the torso around the vertical axis from the moment of pushing the blade into the water and hands action, "short" paddling stroke) were found out in 60% of athletes of the experimental group, which is in 21% less, than in the children of the control group.

Mistakes of the fourth group (muscle tension that is involved in the paddling cycle) have been found out in 40% of children of the experimental group, which is in 32% less than in children of the control group.

The realization of the canoeing technique of the children of the experimental group is better revealed by the number of turnovers from the boat during their first lessons; it is shown in fig. 3.

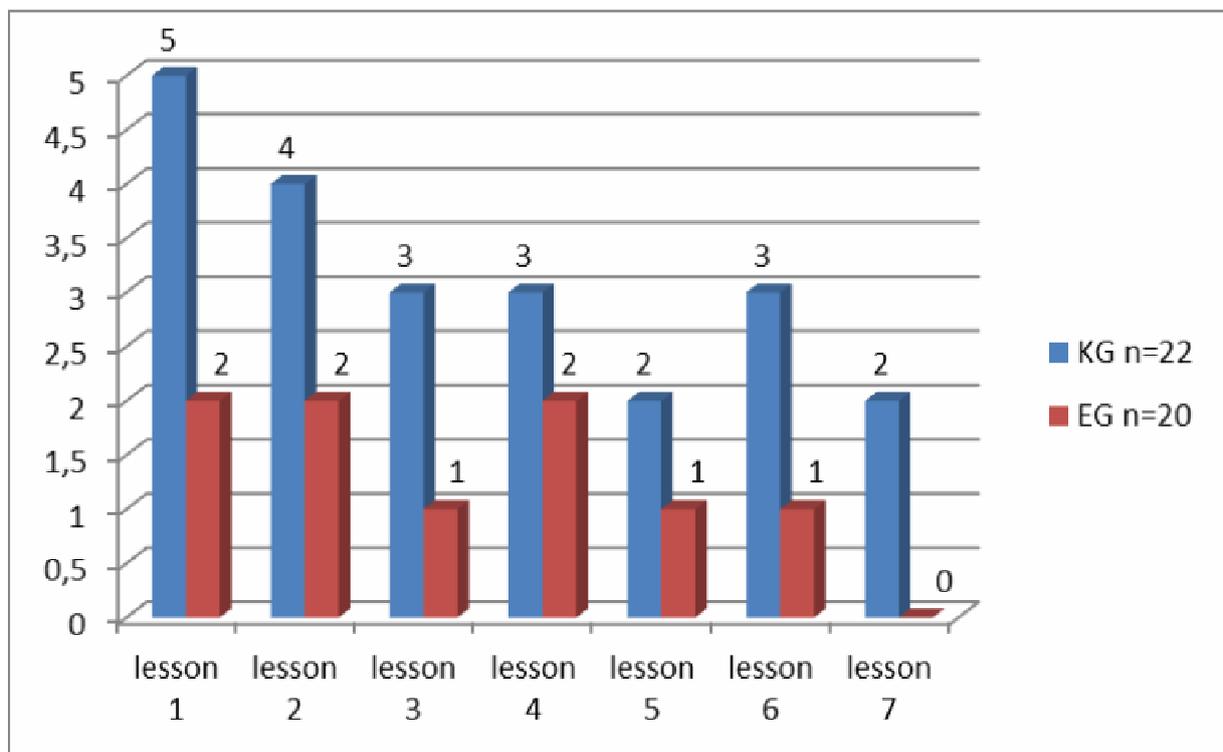


Fig.3 The number of turnovers during the canoeing

Discussion

The results of research on the development of coordination skills of the representatives of various sports (gymnastics, figure skating, water jumping, handball, mogul, and hockey) are revealed in literary sources; factors that determine the level of development of human coordination skills are identified. At the same time, the problem of development of coordination skills of the canoeists at the stage of the basic training hasn't been studied. Therefore, in the system of the canoeists training of different qualifications and of different age groups, the most attention is paid to the development of the ability to maintain a stable posture and the general basis for improving agility. The structure of the coordination skills of the canoeists consists of five factors. The contribution of the first factor (the ability to estimate and regulate the dynamic and spatial-temporal parameters of movement) in the total dispersion is 21.3%; the contribution of the second factor (the level of development of the ability to sense the rhythm) - 16.5%. The third factor (the ability in space orientation) in the total dispersion is 11.03%. The part of the fourth factor (the ability to arbitrarily relax the muscles) in the total dispersion is 10.15%. The fifth factor (the ability to coordinate motions in motor activity) in the total dispersion is 9.97%.

There is an average link between the results at the control distances and the ability to estimate and regulate the dynamic and spatial-temporal parameters of the movement ($r = 0.44$, $r = 0.47$, $r = 0.49$); a weak link has been established between the ability to sense the rhythm and the results at covering the distances of 1000 and 500 m ($r = 0.22$, $r = 0.19$), an average link has been shown at covering the distance of 200 m ($r = 0.453$); a weak link has been indicated between the ability to maintain a stable posture and the result at covering the distance of 200 m ($r = 0.28$), a strong link has been shown between the indicators at covering the distances of 500 and 1000 m ($r = 0.62$, $r = 0.61$). The results of athletes at covering the distances of 1000, and 500 m significantly depends on the ability to coordinate the movements ($r = 0.5$ and $r = 0.54$) and somewhat weaker ($r = 0.31$, $r = 0.29$, correspondently) - on the ability in space orientation. The results at all distances do not depend on the ability to arbitrarily relax muscles. The coordinating training of the canoeists should be carried out in three stages. The first stage (before reaching the water) should ensure an increase in the general level of development of coordination skills of the canoeists. During the second stage it is necessary to promote the purposeful development of special coordination skills (the ability to assess and regulate the dynamic and spatial-temporal parameters of movement, to maintain the balance, to sense the rhythm). The exercises on the simulator and on the rowing bridge are performed. The third stage of training is realized directly on the water, the simulator and the bridge. According to the idea of V. Ozerov, all the exercises used in the process of preparing canoeists-beginners at the stage of basic training were divided into two groups: 1) exercises that develop all coordination skills; 2) exercises that develop coordination of movements in the structure of the main competitive activity.

The overwhelming majority of the coaches believe that high results in canoeing significantly depends on the level of coordination skills development. The significance of different types of coordination skills which help to achieve high results in canoeing they defined in: 1) the ability to coordinate motions in motor activity; 2) the ability to evaluate and regulate the dynamic and spatial-temporal parameters of movements; 3) the ability to

maintain the balance; 4) the ability to arbitrarily relax the muscles; 5) the ability to sense the rhythm. Most coaches believe that the hours allocated by the curriculum are not enough for the successful coordination skills development of the canoeists.

Conclusions

1. An experimental program of coordination skills development of the canoeists at the stage of the basic training includes: means for improving coordination of the general and special-purpose character (the special-purpose exercises were divided into four blocks); methodical techniques (methodical techniques were divided into two groups: the first group - techniques that were used in developing the general coordination skills of beginners, the second group - techniques that were used in improving the coordination skills of athletes in the structure of the main competitive activity); pedagogical conditions for organizing and conducting training sessions.

2. The training program that focuses on the priority of the coordination skills development increases the level of coordination skills improvement of canoeists-beginners. The scale of the coordination skills assessments of the canoeists, which we have elaborated, enables to correctly determine its development. Thus, in the experimental group, before reaching the water, the greatest increase was observed in the development of the ability to sense the rhythm and was 19.83%. Also the high rates were found in the tests for maintaining a stable posture (11.55%) and in the ability in space orientation (11.82%). At the end of the experiment, these figures were 38.79, 13.37 and 34.67% respectively. Before reaching the water in the control group, the greatest increase was found in the ability to coordinate motions in motor activity (4.95%), the smallest was in the ability in space orientation (1.99%) at the end of the experiment (5.58 and 3.39%). Keeping a steady posture in the boat before reaching the water revealed that the time in maintaining the balance for athletes that trained under the coordination skills developmental program was in three times higher than of athletes who trained under the children's and youth sport schools program (9.58 ± 0.58 and 3.89 ± 0.13 s respectively). A similar situation was detected when the initial level of the ability to sense the rhythm was tested.

3. Covering the control distances of 100 and 200 m showed that athletes of the experimental group cover the distance of 100 m in 1.62 s faster than athletes of the control group, and the distance of 200 they cover in 2.09 s faster. This indicator shows that athletes of the experimental group learn the canoeing technique better and faster.

4. The results of the expert assessment of canoeing technique showed that the athletes who were engaged in our program, learned the canoeing technique better, which was expressed in the number of errors that children made. Thus, group I errors occurred in 86% of the children of the control group and only in 65% of the children of the experimental group. Group II errors were found out in 90% of the children of the control group and in 50% of the children of the experimental group. Group III errors were demonstrated in 60% of athletes of the experimental group, which is in 21% less than of the control group. Group IV errors were revealed in 40% of children of the experimental group, which is in 32% less than of the control group.

5. The effectiveness of the experimental program of coordination skills development and its influence on the canoeing technique mastering is testified by the number of turnovers from the boat, which we have recorded during the first lessons after reaching the water. On average, during the first lesson on the water children of the control group had 5 turnovers, and the children of the experimental group had in 3 times less turnovers. During the second lesson, the difference in the number of turnovers between the control and the experimental groups was 2 times. During the third lesson in the experimental group, the average number of turnovers decreased to 1 and in the control group - up to 3. During the following classes a similar situation was observed. Starting from the seventh lesson any turnovers were observed in the experimental group and in the control group still some turnovers were observed within the next three lessons.

6. In order to develop the coordination skills of canoeists-beginners at the stage of basic training, it is necessary to provide the appropriate pedagogical conditions, such as: a variety of means and methodical methods for its implementation in the educational and training process, which will ensure the proper motor experience of canoeists-beginners; the most favorable emotionality within the educational and training lessons; creative approach to children's self-improvement; an active and personal approach.

However, the issue of elaborating the tests for evaluation the level of motor ability and scales for assessing the level of coordination skill improvement of the canoeists of different qualifications and revealing the canoeists sensitive periods of coordination skills development requires further discussion and investigation.

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