

but they need to be used with some caution. It has been established that the existing regulatory and legal framework governing the organization of physical education in higher education institutions practically does not regulate the monitoring of the functional capabilities of students. The technological aspect of the assessment of functional capabilities is not disclosed, and monitoring methods for students with different levels of physical condition and regulatory requirements for functional capabilities are not sufficiently developed and do not meet modern requirements. In the literature available to us there are practically no comprehensive studies in higher education institutions of the functional capabilities of students, taking into account the results of physical fitness and functional tests in the educational process of physical education. In our opinion, the use of integrated monitoring of students' functional capabilities with the help of functional testing with a change in the power of physical activity over a closed cycle and a specially developed battery of tests for physical fitness makes it possible to obtain more accurate and diverse information about the level of functionality of students, as well as optimize the teaching and educational process of physical education in higher education institutions.

Keywords: integrated monitoring, functionality, higher education institutions, physical fitness, functional testing.

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MODELING OF THE COMPETITIVE ACTIVITIES OF HIGHLY QUALIFIED FEMALE ATHLETES SPECIALIZING IN THE MODERN PENTATHLON

Modern pentathlon is a complex type of sport that includes: fencing, swimming, horse riding (show jumping) and combined sport (running, shooting). Sports, which are different in orientation and nature and included in its composition, require athletes to display a significant number of physical abilities and motor skills, different in orientation, due to the structure and content of the competitive activity of the sport. The development of effective models of competitive activity, structured on the basis of the analysis of the results shown by the leading athletes at the largest competitions will allow to optimize the construction of the training. Aim of the study is to build a generalized model of the competitive activity of highly qualified athletes specializing in modern pentathlon. Research methods: analysis and systematization of scientific and methodical literature and information from the official website of the International Federation of Modern Pentathlon (official protocols of the competitions); modeling; methods of mathematical statistics. It was revealed that when forming models of competitive activity, one should focus on characteristics that are significant for achievements in a particular type of competition. Based on the data of the average results shown by female athletes in certain types, a generalized model of the competitive activity of highly qualified athletes specializing in modern pentathlon has been built. Two types of group models of competitive activity in women's modern pentathlon have been determined. The first type is typical for a group of female athletes who are able to achieve high results in fencing, characterized by a high level of speed-power and coordination abilities. The second one unites female athletes who achieve high results in the combined form of modern pentathlon. Thus, when training female athletes specializing in modern pentathlon, special attention should be paid to fencing and increasing the effectiveness of running training.

Keywords: competitive activity, sports training, sportsmen specializing in modern pentathlon, modeling, modern pentathlon, highly qualified female athletes.

Introduction and the current state of the issue

Modern sports training is a multifaceted cycle that integrates various components of sports activities and is focused on the implementation of the ultimate goal - achieving the highest results.

The essence of the functioning of the training system for elite athletes is the need for the manifestation of motor

abilities in their optimal combination in experimental conditions, which are the main competitions (Vrublevskiy, et al., 2016). In this regard, a special role is given to a clear definition of the goal and management of the process of sports training.

In recent years, the interest of specialists in analyzing the specifics of competitive activity has increased, the

study of which in individual sports has received quite a lot of attention in the specialized literature (Vrublevskiy, et al., 2016, 2019, 2020). However, the information related to this aspect in complex types of competitions – all-around events, which are extremely diverse and have complex requirements for the manifestation of special physical, technical, tactical and psychological preparedness, is clearly insufficient (Polischuk, 2001; Dobryinskaya, Kozlova, 2013).

It should be emphasized that a number of researchers determine the study of the structure of competitive activity of athletes from the perspective of a systematic approach (Vrublevskiy, et al., 2016, 2019; Platonov, 2004) as one of the main directions of optimizing the management of the training process of highly qualified athletes. At the same time, their competitive activity creates the necessary conditions for modeling structural formations of the training process, starting from the construction of a separate training and ending with the planning of macrocycles, which, in turn, necessitates planning the content of the training process in strict accordance with the requirements of real competitive activity (Vrublevskiy, Kozhedub, 2018; Sevdalev, et al., 2020; Vrublevskiy, Skrypko, Asienkiewicz, 2020).

All-rounders must have a whole complex of seemingly incompatible motor abilities characteristic of athletes performing in separate forms.

Modern pentathlon is one of the applied types of multiathlon sports. To achieve a high result, a rational

combination of the volumes of funds aimed at improving in all individual types is necessary here. Effective planning of training in the modern pentathlon, in our opinion, will be facilitated by informative analytical data characterizing the relationship of the results in individual types of pentathlon with the general competitive.

Aims of the study: to build a generalized model of the competitive activity of highly qualified athletes specializing in modern pentathlon.

Tasks of the study: to study the specifics of competitive activity in complex types of competitions; to determine the results of the competitive activity of highly qualified athletes in the forms of the modern pentathlon.

Research methods: analysis and systematization of scientific and methodical literature and information from the official website of the International Federation of Modern Pentathlon (official protocols of the competitions); modeling; methods of mathematical statistics.

Results and discussion

We analyzed the performances of highly qualified pentathletes in top tournaments, in particular the 2018 World Cup in Mexico City (Mexico) and the 2019 World Cup in Budapest (Hungary).

Analyzing the results of the performance of the strongest athletes (table 1), we can note the disproportion in individual types of all-around. So, the 2019 world champion O. Silkina achieved the highest result – 270 points, in comparison with other highly qualified female athletes, in fencing.

Table 1

The results of highly qualified female athletes in the types of modern pentathlon

Type of sport	World championship (Mexico 2018)						World championship (Budapest 2019)					
	I		II		III		I		II		III	
	Prokopenko A. Belarus		Schleu A. Germany		Oteiza M. France		Silkina O. Belarus		Micheli E. Italy		French K. Great Britain	
	points	%	points	%	points	%	points	%	points	%	points	%
Fencing	230	17,1	226	17	252	19,0	270	19,7	244	18,0	246	18,1
Swimming	258	19,2	273	20,5	282	21,2	283	20,7	289	21,3	281	20,7
Horseback riding	286	21,2	293	22	300	22,6	297	21,7	286	21,1	283	20,9
Combined type	572	42,5	540	40,5	495	37,2	518	37,9	538	39,6	547	40,3
Total amount	1346	100	1332	100	1329	100	1368	100	1357	100	1357	100

The smallest result – 226 points was shown by A. Schleu – the 2018 world champion. A. Prokopenko has the absolutely best result in the combined relay race – 572 points, the lowest record was achieved by M. Oteiza – 495.

Athletes show the most uniform results in horseback riding – from 286 to the maximum possible 300 points. The results in swimming also do not have a high disproportion from 258 to 289 points.

It should be noted that the largest contribution to the final result belongs to the combined form within 40.5–41%, followed by horseback riding (20.9–22.6%), swimming (19.2–21.3%), fencing (17–19.7%).

The following fact is also interesting in this aspect:

often athletes who are far from the leaders in front of the last view, having shown high results in a combined form, became winners or winners of competitions (Prokopenko, Schleu, 2018).

Combined view combines running (800m × 4) and shooting (4 firing lines). In order to determine the net time spent on running, we summed up the time spent at each firing line (table 2). The results shown by the female athletes range from 0.34.07 minutes (4.68%) to 1.03.57 minutes (8.36%).

As a rule, elite athletes that are showing the best results in running (A. Schleu, M. Oteiza) spend about 6-8% of the total combined time on shooting.

Table 2

The results of highly qualified pentathlon female athletes in combined form

Type of the modern pentathlon	World Championship (Mexico 2018)			World Championship (Budapest 2019)		
	I	II	III	I	II	III
	Prokopenko A. Belarus	Schleu A. Germany	Oteiza M. France	Silkina O. Belarus	Micheli E. Italy	French K. Great Britain
Combined type, min	12:08.23	12:40.02	13:25.14	13:02.20	12:42.01	12:33.82
Running, min	11:34.16	11:16.55	12:33.61	12:19.44	11:53.4	11:45.61
Shooting, min	0:34.07	1:03.57	0:51.53	0:42.76	0:48.61	0:48.21
Firing time of the total result, %	4,68	8,36	6,4	5.78	5,61	6,4

Elite athletes, as a rule, have a pronounced individuality, which consists in high performance indicators of one of the types of modern pentathlon. So, M. Oteiza (2018) and O. Silkina (2019) have the best fencing indicators (253, 270 points respectively), A. Prokopenko (2018) in combined form – 572 points. However, showing high

results in one of the types of female athletes, significantly inferior to the average in others.

Table 3 shows the maximum and minimum results shown by the strongest athletes at the world championships 2018, 2019 (n = 30).

Table 3

The results of the competitive activities of highly qualified female athletes of the world in the types of modern pentathlon

Type of sport in the modern pentathlon	Minimal result		Average result 100%	Maximum result	
	points	% of the average		points	% of the average
Fencing	166	76,15	218,0	270	123,85
Swimming	248	91,51	271,0	294	108,49
Horseback riding	257	92,28	278,5	300	107,72
Combined form	478	90,44	528,5	579	109,56

The highest difference between the averaged data and the maximum, minimum points was found in fencing – more than 23%. In combined form – about 10%, in swimming and horse riding – more than 8% and 7%, respectively.

Thus, by analyzing the structure of the competitive activities of qualified athletes specializing in modern pentathlon, it seems possible to recommend fencing and improving running training, which is the main reserve for the growth of sports results in modern pentathlon, to improve the training of pentathletes for specialists, coaches and athletes.

It should be noted that, according to V. N. Platonov, the training of highly qualified athletes is inextricably intertwined with modeling. Its most important element in modern sport is the modeling of competitive activity, its quantitative and qualitative characteristics, ensuring the achievement of the planned results (2). This type of modeling determines the content of the training process. When forming models of competitive activity, one should be guided by characteristics that are significant for achievements in a particular type of competition.

In the types of multiathlon sports, the authors propose using three types of models:

- generalized;
- group;
- individual.

The generalized models are of an average natural and reflect the competitive activity of a large group of athletes and, according to the authors, can be used in the planning of versatile special training.

Group models reflect the predisposition of a number of athletes to high results in individual types of all-around events, which allows one to formulate individual models of competitive activity with great accuracy, and thus individualize sports training (3).

Based on the data obtained (average results shown by athletes in separate forms, Table 3), a generalized model of the competitive activity of highly qualified athletes specializing in modern pentathlon was built.

Figure 1 shows the average results shown by athletes in the modern pentathlon types: 1 – fencing, 2 – swimming, 3 – horseback riding, 4 – combined form.

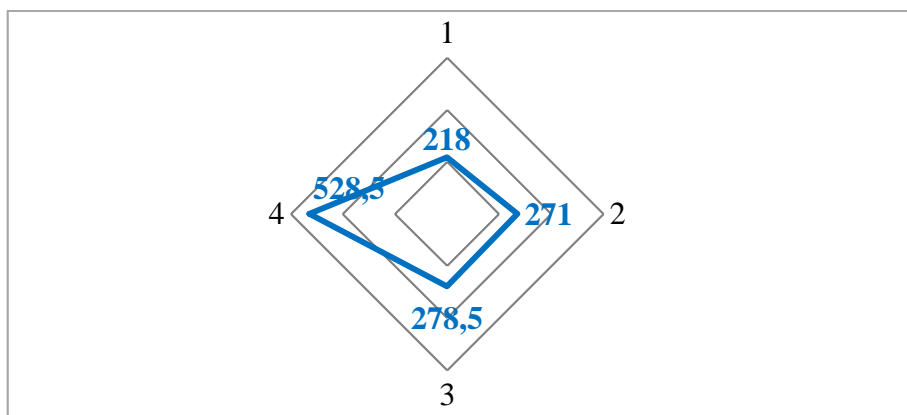


Fig. 1. A generalized model of competitive activity of highly qualified athletes in the modern pentathlon.

The presented model reflects only the general patterns of competitive activity in the modern pentathlon and, in our opinion, does not take into account the individual predisposition of athletes to certain types of pentathlon.

A comparative analysis of the model and individual characteristics of the competitive activity of the winners and prize-winners of the last world championships showed that athletes who show the highest final results in one of the all-around events clearly dominate (Fig. 2).

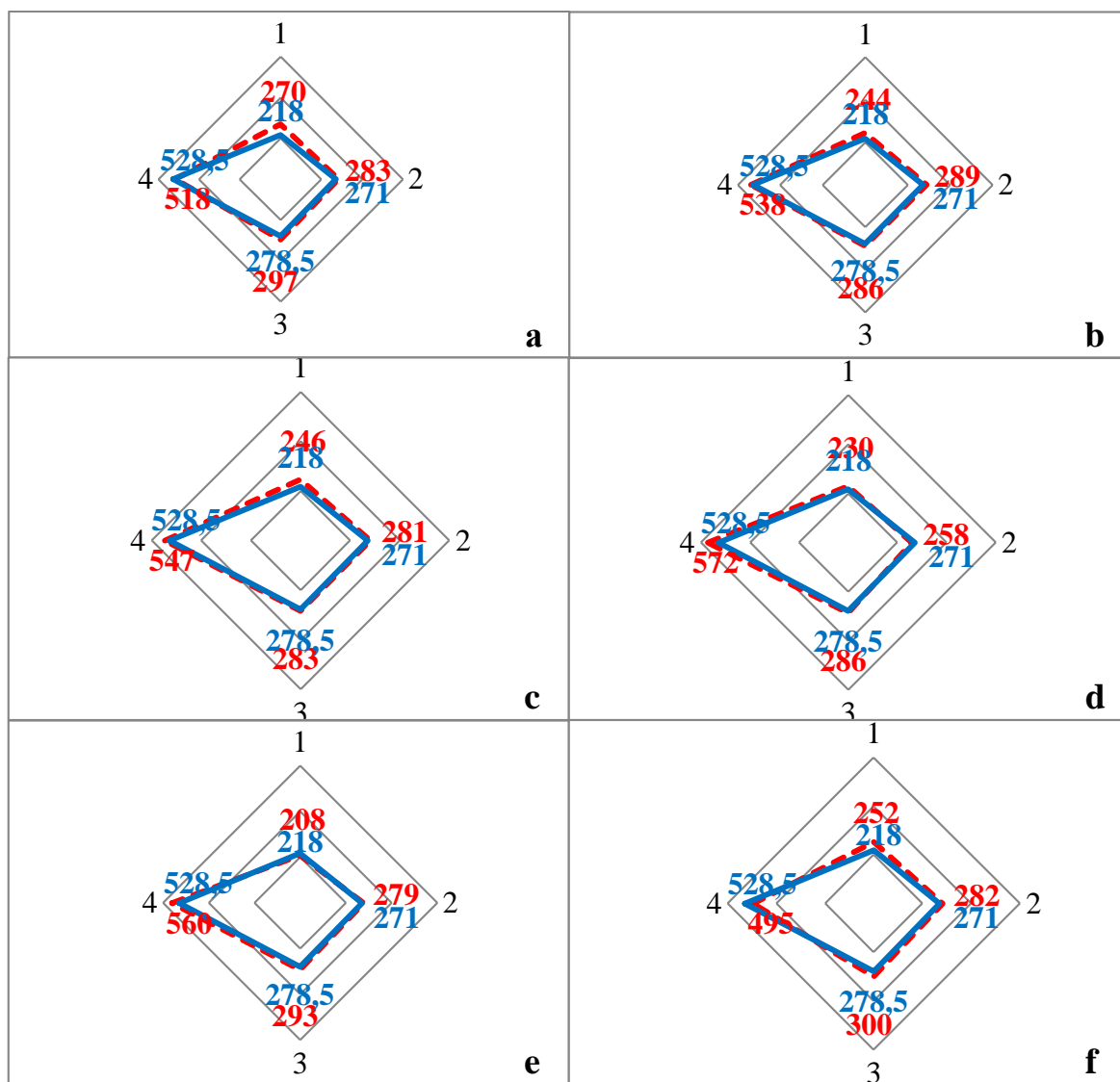


Fig.2. Model and individual characteristics of the competitive activity of highly qualified female athletes of modern pentathlon: a – Silkina O. (Belarus); b – Micheli E. (Italy); c – French K. (Great Britain); d – Prokopenko A. (Belarus); e – Schleu A. (Germany); f – Oteiza M. (France).

So, in Figure 2 (a), it is clear that the results of the 2019 world champion O. Silkina exceed the generalized indicators in fencing by 23.9%, swimming by 4.4% and horseback riding by 6.6%, the exception is the combined form with a deviation in the direction of reduction - 2%. However, it should be noted that speaking in the finals of the World Cup in Budapest (Hungary) and having a sufficiently large margin from the rivals after the last shooting, the athlete quite freely ran the last 800-meter segment, controlling the opponents.

In 2018, the results of the world champion A. Prokopenko, exceed the generalized indicators in fencing by 5.5%, horseback riding by 2.7%, combined form by 8.23%, a deviation to a decrease in swimming results – 4.8% (Figure 2 d).

A comparative analysis of the individual and model characteristics of the winners of the world championships showed that E. Micheli (Fig. 2 b) has results that exceed the generalized indicators in fencing by 11.9%, swimming by 2.6%, horseback riding by 2.7%, combined 1.8%.

A. Schleu's results (Fig. 2e) exceed the generalized indices in swimming by 2.95%, horseback riding by 5.21%, combined form by 5.96%, a deviation in the direction of decrease in fencing results - 4.6%.

M. Oteiza (Fig. 2 f) – the results shown exceed the generalized indicators in fencing by 18.35%, swimming by 4.06%, horseback riding by 7.72%, deviation in the downward direction in the combined results by 6, 34%.

The results of K. French (Fig. 2 c) exceed the generalized indices in swimming by 3.69%, fencing by 12.84%, horseback riding by 1.62%, combined form by 3.5%.

Analyzing the data obtained, we can distinguish two types of group models of competitive activity in the women's modern pentathlon.

The first type is typical for a group of athletes who are able to mainly achieve high results in fencing, characterized by a high level of speed-power and coordination abilities.

The second – unites athletes who achieve high results in the combined form of the modern pentathlon. Athletes whose competitive activity corresponds to the second type are inferior to the representatives of the first in terms of speed-power potential and the development of coordination abilities, but they significantly surpass them in the manifestation of types of endurance.

Thus, an analysis of the structure of the competitive activity of qualified female athletes specializing in modern pentathlon showed that specialists, coaches and ath-

letes, when improving the training system of pentathletes, should pay special attention to fencing and increase the efficiency of running training, which, due to a change in the rules of the competition, is the main reserve for the growth of their sports results in the modern pentathlon.

Conclusions

The data obtained allow us to formulate the following statements:

1. It is possible to optimize the management of the training process by structuring it, based on an analysis of the results of the performances of leading female athletes in major competitions.

2. Optimal management of the training process is directly related to the development of effective models of competitive activity, structured on the basis of analysis of the results shown by leading female athletes in major competitions. It is recommended to use generalized, group and individual models in types of all-around types of sport.

3. Generalized models are used in planning versatile special training; group models reflecting the predisposition of athletes to certain types of all-around events are applicable in the process of individualization of sports training. Based on group models, individual ones are formed that predetermine the content of the training process.

4. The analysis of the performances of highly qualified pentathletes in top tournaments (World Cup 2018, 2019) allowed us to build generalized and group models of competitive activity. A generalized model can be used in planning basic, versatile training.

5. Two types of group models of competitive activity in women's modern pentathlon have been defined. The first type is characteristic of a group of athletes who are mainly able to achieve high results in fencing, characterized by a high level of speed-power and coordination abilities. The second - unites athletes who achieve high results in the combined form of the modern pentathlon. Athletes whose competitive activity corresponds to the second type are inferior to the representatives of the first in terms of speed-power potential and the development of coordination abilities, but they significantly surpass them in the manifestation of types of endurance.

6. In constructing the training process for women, it is advisable to rely on the principle of individualization, which determines the optimal overall performance and the proper level of their special preparedness.

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МОДЕЛЮВАННЯ ЗМАГАЛЬНОЇ ДІЯЛЬНОСТІ ВИСОКОКВАЛІФІКОВАНИХ СПОРТСМЕНОК, ЯКІ СПЕЦІАЛІЗУЮТЬСЯ У СУЧАСНОМУ П'ЯТИБОРСТВІ

Сучасне п'ятиборство є комплексним видом спорту, що включає в себе: фехтування, плавання, верхову їзду (конкур) і комбінований вид (біг, стрільба). Різні за спрямованістю і характером види спорту, які входять до його складу, вимагають від спортсменів прояви значної кількості різних за спрямованістю фізичних здібностей і рухових навичок, обумовлених структурою і змістом змагальної діяльності виду спорту. Оптимізувати побудову тренувального процесу дозволить розробка ефективних моделей змагальної діяльності, структурованих на основі аналізу результатів, показаних провідними спортсменами на найбільших змаганнях. Метою дослідження було побудувати узагальнену модель змагальної діяльності висококваліфікованих спортсменок, які спеціалізуються в сучасному п'ятиборстві. Методи дослідження: аналіз і узагальнення науково-методичної літератури та інформації офіційного сайт міжнародної федерації сучасного п'ятиборства (офіційні протоколи змагань); моделювання; методи математичної статистики. У процесі досліджень проаналізовано структуру змагальної діяльності кваліфікованих спортсменок, які спеціалізуються в сучасному п'ятиборстві. Виявлено, що при формуванні моделей змагальної діяльності слід орієнтуватися на значущі для досягнень в конкретному виді змагань характеристики. Ґрунтуючись на даних про середні результати, показаних спортсменками в окремих видах, побудована узагальнена модель змагальної діяльності висококваліфікованих спортсменок, які спеціалізуються в

сучасному п'ятиборстві. Визначено два типи групових моделей змагальної діяльності в жіночому сучасному п'ятиборстві. Перший тип характерний для групи спортсменок, здатних переважно досягати високих результатів у фехтуванні, що відрізняються високим рівнем швидкісно-силових і координаційних здібностей. Другий об'єднує спортсменок, що досягають високих результатів в комбінованому вигляді сучасного п'ятиборства. Отже, при підготовці спортсменок, які спеціалізуються в сучасному п'ятиборстві, особливу увагу слід приділяти фехтуванню і підвищенню ефективності бігової підготовки.

Ключові слова: змагальна діяльність, спортивна підготовка, багатоборці, моделювання, сучасне п'ятиборство, висококваліфіковані спортсменки.

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ОСОБЛИВОСТІ ТРЕНУВАЛЬНОГО ПРОЦЕСУ СТУДЕНТІВ-БОКСЕРІВ З УРАХУВАННЯМ СТАНУ ЇХ ПСИХОМОТОРИКИ

Стаття присвячена розгляду проблеми організації тренувального процесу на заняттях з боксу в закладах вищої освіти. Визначення особливостей стану психомоторики у студентів-боксерів та його врахування в динаміці тренувальної діяльності дозволяє оптимізувати процес фізичної підготовки майбутніх фахівців та сприяє досягненню запланованих спортивних результатів. Метою роботи є дослідження стану психомоторики у студентів-боксерів за умов використання спеціалізованих координаційних фізичних вправ. В дослідженні брали участь 20 студентів чоловічої статі віком 18–20 років, що визначили в якості секційної моделі занять з фізичного виховання бокс. У роботі використані наступні методики: «Зорові сенсомоторні реакції» – проста зорово-моторна реакція і складна зорово-моторна реакція, «Реакція на рухомий об'єкт» – сенсомоторна точність, «Тепінг-тест» – швидкість провідної руки, «Вимірювання динамометричних зусиль», тривалість виконання тесту човниковий біг 4 по 9 м, а також ж статичної рівноваги (проба Ромберга). Розроблена спеціалізована тренувальна програма, яка складається з дев'яти комплексних спеціалізованих фізичних вправ, спрямованих на розвиток координаційних якостей студентів-боксерів. Встановлена достовірна позитивна динаміка показників стану психомоторики у студентів-боксерів за умов застосування спеціалізованих фізичних вправ координаційної спрямованості. Отримані результати розширюють наукову інформацію щодо необхідності врахування стану психомоторики у студентів, що займаються боксом. Авторами доповнено існуючі програми тренувального процесу, спрямованого на вдосконалення у студентів-боксерів координаційних якостей. У контексті моделювання сучасної системи фізичного виховання в закладах вищої освіти доведена ефективність використання секційної форми організації занять, яка передбачає врахування індивідуалізованих особливостей стану психомоторики студентської молоді.

Ключові слова: психомоторика, координація, студенти, бокс, фізичні вправи.

Вступ та сучасний стан досліджуваної проблеми

Сучасна студентська молодь являє собою особливу соціальну групу, для якої характерною є низка специфічних умов життєдіяльності та особистісного

розвитку. В останні роки спостерігається зниження рівня рухової активності студентів, що обумовлене не тільки збільшенням витрат часу на учбову діяльність, але і способом життя, який став звичним для більшості молоді (захоплення комп'ютерними іграми,