

## The comparison of students' long jump study programs

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## Abstract

**Background and Study Aim:** The modern educational process in physical education needs to form educational competencies for a limited time. It is necessary to use modern approaches. Purpose – to determine the effectiveness of holistic and differentiated methods of study the technique of long jumps by combat sports students.

**Material and methods:** *Objects.* 20 healthy first-year students of bachelor of different sports qualification, who are engaged in single combats (n = 20). Following the results of the stating experiment, the participants were divided into two groups: group A (n = 10) – students with a satisfactory level of physical fitness; group B (n = 10) – students with a high level of physical fitness. *Methods:* testing of physical fitness using specific field tests for long jumpers for to determine the physical fitness of combat sports students and their ranking by test groups (30 m running (s); standing long jump (cm) 5-fold jump on the take-off leg (cm); triple standing jump (cm); long jump (cm)); record video and video analysis of the elements technique of the long jump (long jump (cm); speed of the last 5 m of running start (m/s); speed of the last 10 m running start (m/s); take-off time (m/s); tempo of the last six steps (step/s)) – in order to determine the technique of the long jump from a run; the statistics made it possible to determine the effectiveness of programs of study the technique of the long jump by comparing the indicators of the initial and repeated video analysis of the records. *Approach.* The impact of two study programs on long jumps with a running start of students was investigated. They learn to become coaches and are engaged in types of single combats. Programs are developed considering two approaches: 1) holistic execution of different jumps (holistic approach); 2) performing special exercises and long jump parts (differentiated approach). To form study programs, the main exercises for studying long jump techniques were chosen.

**Results:** At the beginning of the study, the indicators of physical fitness were stated. The objects were ranked into two different groups A (satisfactory level of physical fitness) and B (high level of physical fitness) (p<0.05): 30 m running – [4,53 s (Group A); 4,39 s (Group B)]; standing long jump – [235,63 cm (Group A); 273,38 cm (Group B)]; 5-fold jump on the take-off leg – [1223.50 cm (Group A); 1270.88 cm (Group B)]; triple standing jump – [635,88 cm (Group A); 667,38 cm (Group B)]; long jump – [451,75 cm (Group A); 472,63 cm (Group B)]. After used approach, it was found that as a result of study the long jump technique using different programs, the test results significantly improved (p<0.05): long jumps – for the athletes of Group A [451,75 cm; 478,50 cm], for the athletes of Group B [472,63 ; 491,88 cm]; speed of the last 5 m of running start – for the athletes of Group A [6,41; 6,47 m/s], for the athletes of Group B [6,79 ; 6,87 m/s]; speed of the last 10 m running start – for the athletes of Group A [6,42; 6,48 m/s]; take-off time – for athletes of Group A [0,23 ; 0,21 m/s], for the athletes of Group B [0,22; 0,20 m/s]; tempo of the last six steps – for the athletes of Group A [3,01 ; 3,13 steps/s], for the athletes of Group B [3,24 ; 3,41 steps/s]. The positive impact of the developed programs on speed indicators of running start and take-off in both test groups was found. All indicators as a result of intra-group and inter-group comparison significantly differed from the beginning to the end of the research (p<0,05). The exception was indicators of take-offs, which didn't differ significantly in groups A and B (p>0,05).

**Conclusion:** The effectiveness of the influence of both developed training programs on the long jump technique was discovered. Despite the previous motor experience and nonspecialized sports activity, it is possible to introduce different ways of studying motor actions, which are provided by the educational program. This allows you to maximize the individual opportunities of students. The presented long jump approaches allow using the level of physical fitness of trained individuals as a basis for the formation of educational programs. This allows you to increase the motivation, curiosity, and effectiveness of training a modern specialist in physical education. The development of flexible programs for students to study in other types of track and field is necessary.

**Keywords:** track and field, athletics, physical education, combat sports, training program, long jump, physical fitness.

## Анотація

Порівняння ефективності програм навчання студентів стрибкам у довжину.

Андрій Єфременко, Світлана Пятисоцька, Віктор Павленко.

**Передумови та мета дослідження:** Сучасний освітній процес з фізичного виховання потребує формування освітніх компетентностей протягом обмеженого часу. Необхідно використовувати сучасні підходи. Мета – визначити ефективність цілісної та диференційованої методики вивчення техніки стрибків у довжину студентів, які займаються спортивними єдиноборствами.

**Матеріал і методи:** Об'єкти: 20 здорових студентів бакалаврського рівня першого курсу різної спортивної кваліфікації, які займаються єдиноборствами (n = 20). За результатами констатуючого експерименту учасники були розподілені на дві групи: група А (n = 10) – студенти із задовільним рівнем фізичної підготовленості; група Б (n = 10) – студенти з високим рівнем фізичної підготовленості. Методи: визначали фізичну підготовленість студентів за допомогою специфічних рухових тестів, які використовуються стрибками у довжину з метою ранжування єдиноборців у тестові групи (біг на 30 м (с); стрибки в довжину з місця (см), 5-кратний стрибок з місця на поштовховій нозі (см); потрійний стрибок з місця (см); стрибок у довжину з місця (см)); запис відео та відеоаналіз елементів техніки стрибків у довжину (стрибок у довжину з повного розбігу (см); швидкість останніх 5 м розбігу (м/с); швидкість останніх 10 м розбігу (м/с); час відштовхування від планки (м/с); темп останніх шести кроків (шаг/с)) – для визначення техніки стрибка в довжину з розбігу; статистичний аналіз дозволив визначити ефективність програм вивчення техніки стрибків у довжину шляхом порівняння показників первинного та повторного тестування. Підхід. Досліджено вплив двох навчальних програм на стрибки в довжину з розбігу студентів – майбутніх тренерів, що займаються різними видами єдиноборств. Програми розробляються з урахуванням двох підходів: 1) цілісного виконання різних стрибків

(цілісний підхід); 2) виконання спеціальних вправ і частин стрибків у довжину (диференційований підхід). Для формування навчальних програм обрано основні вправи для вивчення техніки стрибків у довжину.

**Результати:** На початку дослідження були визначені показники фізичної підготовленості. Об'єкти були розподілені за двома різними групами: Група А (задовільний рівень фізичної підготовленості); Група Б (високий рівень фізичної підготовленості) ( $p < 0,05$ ): біг на 30 м – [4,53 с (група А); 4,39 с (група Б)]; стрибки в довжину з місця – [235,63 см (група А); 273,38 см (група Б)]; 5-кратний стрибок на поштовховій нозі – [1223,50 см (група А); 1270,88 см (група Б)]; потрійний стрибок з місця – [635,88 см (група А); 667,38 см (група Б)]; стрибок у довжину – [451,75 см (група А); 472,63 см (група Б)]. За використаним підходом встановлено, що в результаті вивчення техніки стрибків у довжину за різними програмами результати тестування достовірно покращилися ( $p < 0,05$ ): стрибки у довжину – у спортсменів групи А [451,75 см; 478,50 см], у спортсменів групи Б [472,63 ; 491,88 см]; швидкість останніх 5 м розбігу – для спортсменів групи А [6,41; 6,47 м/с], у спортсменів групи Б [6,79; 6,87 м/с]; швидкість останніх 10 м розбігу – для спортсменів групи А [6,42; 6,48 м/с]; час відштовхування – для спортсменів групи А [0,23 ; 0,21 м/с], для спортсменів групи Б [0,22; 0,20 м/с]; темп останніх шести кроків – для спортсменів групи А [3,01 ; 3,13 крок/с], для спортсменів групи Б [3,24 ; 3,41 крок/с]. Виявлено позитивний вплив розроблених програм на швидкісні показники розбігу та розбігу в обох групах студентів. Усі показники в результаті внутрішньогрупового та міжгрупового порівняння вірогідно відрізнялися від початку до кінця дослідження ( $p < 0,05$ ). Виняток становили показники часу відштовхування, які достовірно не відрізнялися в групах А та Б ( $p > 0,05$ ).

**Висновки:** Виявлено ефективність впливу обох розроблених тренувальних програм на техніку виконання стрибків у довжину. Не дивлячись на попередній руховий досвід і непрофільну спортивну діяльність, можна запроваджувати різні способи вивчення рухових дій, які передбачені навчальною програмою. Це дозволяє максимально розкрити індивідуальні можливості студентів. Представлені програми навчання техніці стрибків у довжину дозволяють використовувати рівень фізичної підготовленості підготовлених осіб як основу для формування навчальних програм. Це дозволяє підвищити мотивацію, цікавість, ефективність підготовки сучасного фахівця з фізичного виховання. Надалі необхідна розробка гнучких програм для навчання студентів іншим видам легкої атлетики.

**Ключові слова:** легка атлетика, фізичне виховання, єдиноборства, програма підготовки, стрибки в довжину, фізична підготовленість.

## Introduction

The assimilation of professional competence by students is a modern condition for the training of future specialists in the field of physical education. This process provides programming for physical exercise training. The ability of an individual to perform effective movements determines the available variety of motor skills. Most athletics exercises are simple (fundamental) movements. However, the technique of competitive types of track and field isn't always easy to study and demonstrate qualitatively [1, 2, 3, 4]. At the beginning of studies in athletics exercises, a motor skill is quickly formed. It is difficult to change the technique of performing the exercise if it was learned erroneously. Already at the beginning of the study, it is necessary to form a rational basis for performing motor actions.

The high competence of a sports coach is determined by the variety of motor skills. Therefore, the educational programs of educational institutions of physical culture include the study of various sports. At the same time, a narrow sports specialization forms a specific motor stereotype among students of different sports [5]. In case of insufficient development of coordination, this leads to difficulty in teaching non-specific movements for the chosen sport.

Leading researchers point out that single combats' inherent impulse, acyclic, variable motor activity in the adversarial and training process [6, 7]. This is consistent with the idea of the features of motor activity in the types of athletics. Determined the structure of long jump: cyclic run; one take-off (by one leg); long flight period (special position of sportsman's body). Each part of this exercise requires the manifestation of power and high speed of reaction. However, stability is required when taking off [8, 9]. This contrasts with the variability and impulsiveness of combat athletes' actions. At the same time, the high mobility and coordination of combat athletes can contribute to high-quality studying in other types of motor activity [10].

The difficulty of study the kinds of athletics consist of in the specificity of motor activity and the inability to fully extrapolate the teaching methodology from the types of martial arts. However, the quality of study consists of in the formation of a rational technique for the types of running, jumping and

throwing [11]. This will allow students to form the motor competencies necessary to create the variability of influences in the framework of their professional activities. This requires the search and development of specific training programs for the kinds of athletics in relation to the contingent of students using the available means. The means that are available include a video recording of motor actions, so use of video in the educational process enhances feedback and improves performance [12, 13, 14, 15].

Today, there are two main approaches to teaching the types of athletics: holistic and differentiated. However, the strategy of their use is justified only in studying beginners and for a long training program (from 30 weeks) [16, 17]. Copying such approaches does not meet the conditions of the specialty «Coaching in the chosen sport»: the duration of training for 8 kinds of athletics is 12 weeks; specificity of the trained contingent (student-athletes). At the same time, it was found that for the formation of a motor skill, it is necessary to have at least 20 lessons for long jumps [18, 19]. Opinions are also ambiguous regarding the effectiveness of a certain strategy for studying the types of athletics. The effectiveness of both a holistic and a differentiated approach to studying has been substantiated. Their effectiveness has been revealed, with the advantage of being holistic for studying children [20], and differentiated for studying adults [21]. However, their influence on the quality of teaching the long jump technique to student-athletes has not been researched.

Therefore, **the purpose of the research** is to determine the effectiveness of holistic and differentiated methods of study the technique of long jumps by combat sports students.

## Materials and Methods

**Methods:** observation; measurement and accounting; statistic-mathematical.

**Objects.** The sample consisted of 20 healthy sub-elite student-athletes ( $n=20$ ) of combat sports (judo, grappling, sambo, Greco-Roman wrestling, WTF karate), studying in the first

year ( $M=18,6$ ;  $SD=0,6$  year) bachelor's degree in the specialty «Coaching in the chosen sport» of the Kharkiv State Academy of Physical Culture. Following the results of the stating experiment, the participants were divided into two groups: group A ( $n = 10$ ; Weight  $M=60,88$ ;  $SD=4,55$ ; Height  $M=167,50$ ;  $SD=3,21$ ) – students with a satisfactory level of physical fitness; group B ( $n = 10$ ; Weight  $M=60,63$ ;  $SD=5,85$ , Height  $M=165,25$ ;  $SD=5,60$ ) are students with a high level of physical fitness. Only combat student-athletes who met the following characteristics participated: experience of regular training of combat sports (at least three training sessions per week, without unreasonable breaks for more than three weeks) – at least three years; lack of training experience in athletics; skill level – sub-elite. From this point of view, the sample was representative. Ethical approval for all types of testing was obtained from the Kharkiv State Academy of Physical Culture Ethics Committee. Participation was voluntary, students were informed and agreed to participate in the research. The research responded to the Helsinki Declaration of Ethics.

**Observation.** In the process of studying and monitoring its effectiveness, observation was carried out using video analysis of long jumps. The length of jumps was measured by the traditional method using roulette. Running speed was measured using Cronox 2.0 (Madrid, Spain). To assess students' studies, there were selected indicators that characterize the long jump technique: long jump (cm); speed of the last 5 m of running start (m/s); speed of the last 10 m running start (m/s); take-off time (m/s); tempo of the last six steps (step/s) [22, 23]. Indicators were obtained by analyzing video records of long jumps at the beginning and end of the research. Video recording setup met standard protocols in long jump researches [24, 25]. Reference markers were placed on parallel lines of the run-off zone (30 m) in 1 m. Each long jump was recorded using stationary video camera Nikon 1 J1 (Tokyo, Japan) at a speed of 60 frames/sec (objects 10 mm) in the video format MOV. The videos had extensions of 1280x720 pixels. The camera was located at a distance of 10 m from the run-off zone. The camera was fixed on a tripod at a height of 1,5 meters. Each of the participants performed three long jumps at the beginning and end of the re-

search. The entire run distance of each participant was recorded. The analysis of video recordings was carried out according to developed recommendations [26, 27]. Tracker software version 4.94 was used to analyze and model video. The rate of take-off was calculated during the video recording analysis of the long jump attempt. The video determined the moment of the first touch with the foot of the take-off place (the beginning of the single-support position). Subsequently, the stopwatch was turned on and turned off when the participant completely completed the take-off (the beginning of the safe phase). Each participant made 3 attempts. The best results were chosen from each attempt.

**Intervention.** The current level of physical fitness of students is defined in the process of establishing the experiment.

In the process of forming the experiment, the effectiveness of studying the long jump technique of students by the author's programs is defined. The research was conducted during the study of the discipline «Track and field with teaching methods» by students for the specialty «Coaching in a chosen sport». The intervention program was developed taking into account the purpose of the research and modern approaches to studying athletics exercise techniques [1, 2, 28, 29, 30, 31, 32]. In Group A, the study methods are shown in Table 1:

The group A exercises involved special exercises and long jump parts (differentiated approach). In group A, not all exercises were performed at each lesson. However, each lesson included jumps in the position «step» and long jumps with an average running start. The total number of take-offs in class is 71-97.

In group B, the study methods are presented in table 2:

The group B exercises provide for the implementation of a holistic method of learning about jumping. In group B, not all exercises were performed during each lesson, but each lesson included long jumps from an average to a full running start. The total number of take-offs in a lesson is 29-40.

Both groups performed jumps from a full running start. Group A – in classes 1, 3, 6.

The study programs were designed for 6 weeks. In the first week, students get acquainted with the technique of the

**Table 1 – The training program of the «Group A» participants**

Exercise	Dosing	Instructions
1. Simulation of take-off	20-30 take-offs	To perform in place and with gradual forward movement
2. Jumps in the position «in step»	8-12 times	Running start 2-4 running steps Running start 6-8 running steps With landing on the fly leg and subsequent run out of the hole
3. Jumps with a short running	9-15 times	Delivering suspended objects with hands, head, knee of the fly leg (height, respectively, 2,5 m, 2,0 m, 1,3 m) The distance is 1,5-2,0 m from the point of take-off. Running start 6-8 running steps
4. High jumps	8-12 times	Take-off with a sportsman's push leg, followed by a landing on 2 legs
5. Jumps «in step» on the field	2x20-30 m	Take-off for each 3, 5 steps
6. Long jumps	3 jumps	With 2, 3, 5 take-off steps
7. Long jumps	3-5 jumps	From a short and average running start, performing the last 3 steps on the marks or under sound signals

**Table 2 – The training program of the «Group B» participants**

Exercise	Dosing	Instructions
1. Jumps «in step» on the field	2x20-30 m	With 2, 3, 5 take-off steps
2. Long jumps	3-6 jumps	With 2, 3, 5 take-off steps
3. Long jumps	3-6 jumps	From a short and average running start, performing the last 3 steps on the marks or under sound signals
4. Repeated run on a running start	3-6 times	Without take-off and with take-off
5. Long jumps	4-6 jumps	With a full running start

long jump and determined the level of physical fitness. In the sixth week, students were tested. Thus, the main study of the long jump took place for 4 weeks. The duration of the jumping class, which was part of the structure of a practical lesson in an academic discipline, was 30 minutes. The developed programs met the purpose of studying the educational discipline "Track and field with teaching methodology". They ensured that students learned the competencies that are fixed in the curriculum.

During the session, the study was conducted by video filming the main parts of the long jump: running start; take-off; flight; landing. Immediately after the attempt, participants reviewed video recordings with comments in cases: at the initial stage of study; significant errors; at own will.

**Physical fitness testing.** To determine the level of physical fitness of participants, selected tests were taken that characterize the level of special qualities of long jumpers: 30 m running (s); standing long jump (cm) 5-fold jump on the take-off leg (cm); triple standing jump (cm); long Jump (cm). All tests were familiar to the participants and pre-tested. There were two identical test sessions from 10 a.m. to 12 a.m. before and after the intervention. Participants were asked not to consume food for 2 hours before testing for physiological and psychological preparation for the trial. Do not consume caffeine or exercise for 12

hours before the trial. Before testing, participants performed a warm-up for 5-10 minutes (light running, lateral displacements, dynamic stretching, and jumping) at HR=100-130 b.p.m.

**Statistics.** Statistical analysis was performed using the software Statistica 10 (Tulsa, USA) for Windows.  $P < 0,05$  was considered statistically significant. Descriptive statistics: mean (M), standard deviation (SD). The parametric criterion t-test was used to compare experimental characteristics (the difference between two independent means; two groups). The normality of testing results distribution was determined by the calculation of the Kolmogorov-Smirnov test [33, 34].

**Results**

The selected tests are recommended to determine the level of physical fitness of long jumpers [33]. Of course, they are nonspecific for students who are engaged in single combats.

First, the individual level of physical fitness of participants of the research was determined, without taking into account the long jump technique. The consistency of the empirical distribution of test results was found to be normal based on the Kolmogorov-Smirnov test.

T-test was used to compare the results between groups. The results of long jumps with a running start of participants

**Table 3 – The level of physical fitness of participants of the research**

Indicator	Group	M	SD	t (p)
30 m running (s)	A	4,53	0,07	4,49
	B	4,39	0,04	0,001*
Standing long jump (cm)	A	235,63	8,26	0,47
	B	237,38	6,50	0,65
5-fold jump on the take-off leg (cm)	A	1223,50	22,03	4,64
	B	1270,88	18,64	0,001*
Triple standing jump (cm)	A	635,88	15,22	3,70
	B	667,38	18,65	0,002*
Long jump (cm)	A	451,75	12,20	3,63
	B	472,63	10,77	0,003*

Explanation: \* - results are significantly different ( $p < 0,05$ )

**Table 4 – Test results after execution of the author's study program for long jumps**

Indicator	Group	M		SD		t (p)	
		Test 1	Test 2	Test 1	Test 2	+	++
Long jump (cm)	A	451,75	478,50	12,20	9,89	8,65 0,001*	2,48 0,03*
	B	472,63	491,88	10,77	11,59	10,30 0,001*	
Speed of the last 5 m of running start (m/s)	A	6,41	6,47	0,20	0,17	2,66 0,03*	4,01 0,001*
	B	6,79	6,87	0,25	0,23	3,36 0,01*	
Speed of the last 10 m running start (m/s)	A	6,42	6,48	0,16	0,17	2,90 0,02*	3,58 0,003*
	B	6,76	6,78	0,22	0,27	0,28 0,79	
Take-off time (m/s)	A	0,23	0,21	0,04	0,03	3,32 0,01*	1,20 0,25
	B	0,22	0,20	0,03	0,02	2,81 0,03*	
Tempo of the last six steps (step/s)	A	3,01	3,13	0,09	0,07	6,75 0,001*	3,09 0,01*
	B	3,24	3,41	0,17	0,25	-5,40 0,00101*	

Explanation: \* - results are significantly different ( $p < 0,05$ ); + – comparison of results at the beginning and the end of the research in groups A and B; ++ – comparison at the end of the research between groups A and B.

were ranked and equally divided into groups with a satisfactory level (group A) and a high level of physical fitness (group B). The results of physical fitness testing of the participants in groups A and B differed significantly by all tests (Table 3).

The exception is standing long jump. We believe that this is due to the specifics of the sports activities of students-martial artists. This test shows the specific ability of martial artists to perform explosive work with their feet during the fight. Thus, students were correctly assigned to groups following the level of physical fitness. In the future, students studied long jumps with a running start by various developed programs. All participants of the research completed the curriculum completely.

The repeated testing (Table 4) of physical fitness of students-martial artists and long jumps with a running start revealed a reliable increase in results of groups A and B for all indicators. The indicator of «running speed at the last 10 m of the run» in group B increased only insignificantly. We believe that this is due to the lack of special exercises in the study program for the development of running speed. Students of the group B had reliably higher results by all tests at the end of the research. Only the indicator of «take-off time» didn't differ significantly. We believe that this indicator is specific to the long jump technique and doesn't have significant predictive value for persons who aren't specialists in jumps.

## Discussion

The initial hypothesis of the research provided for determining the effectiveness of two study programs of long jumps with a running start of students-martial artists. While studying at high school, they had an idea about the technique of long jumps with a running start. The influence of the level of physical fitness on the effectiveness of studying long jumps with a running start was also determined. By the research hypothesis, two sets of exercises were developed for students to study long jump. At the beginning of the research, participants were presented with the developed study programs and their content was arguably explained. That is, students-martial artists of group A understood that they had the low level of physical fitness for studying long jumps. But, students-sportsmen of group B were motivated to focus on maximizing their potential in studying the best jumping technique. Thus, both programs responded to the implementation of the problematic approach in study [35]. In the course of study, the demonstration of video recordings of performing key phases of jump to participants directly in the course of study was used [36]. The choice of long jumps to realize the purpose of the research was based on the fundamentality of jump movements; participants' motor experience in this exercise complex (mixed) nature of the exercise. The greatest difficulty of long jump lies in the transition from running start to the flight phase, although the outward exercise looks like simple [37]. The motor experience of students-martial artists was to reduce the number of errors during the study. That is why such a contingent of participants was elected. Long jump is a holistic exercise, but has a mixed character of motor activity. This made it possible to develop excellent programs: holistic, the study of which allows you to focus on performing exercises in different modes; differentiated character, which provided for the distribution and study of individual phases of jump. These approaches were consistent learning tools: defined by the order of performance of movements (partial practice, diverse practice, random practice); theoretical information; using feedback to correct errors [3].

The increase in the level of physical fitness, the result

of holistic exercise, and the difference in most test parameters confirms the dependence of the jumping technique on the level of special physical abilities. This is consistent with evidence that a good jumper should have a high level of physical and technical fitness [36]. Students who have a sufficient level of physical fitness can learn the long jump technique under a program that is characterized by less exercise variability. They should focus on the holistic execution and key phases of jumping. This will reduce the time of study and the volume of physical activity, increase the curiosity of study. Students who have an insufficient level of physical fitness should perform specialized exercises for long jump exercises to increase the level of fitness. Such exercises are reusable execution of individual parts of jump.

The detected effectiveness of the study program in group A confirms the priority value of the run speed for the qualitative performance of long jump. This is consistent with the results of Iseni & Abdullai [38]. The exercises included in the program make it possible to improve effectively the special speed skills of students who study long jump and aren't specialists in this form. It is confirmed that a physically trained student can teach effectively different movements that differ from his sports specialization [39]. However, indicate that the level of physical fitness of students should be taken into account [41]. A certain level of understanding and awareness of the program and the planned impact of the program must be achieved before the training can begin.

The development of programs was based on the need to improve the learning process of students who have regular sports practice. The previous data is confirmed [42]. The concept «positive transfer» motor skills is presented in the current study characterizes the baseline level of physical fitness [39]. It allows you to learn effectively the complicated options for fundamental human motor actions. The detected effectiveness of programs indirectly indicates the possibility of determining the so-called «sufficient level» (basic) preparedness. It can be achieved through various sports. The presence of such a level provides advantages in the training of a modern specialist in physical education.

The demonstration of video recordings of the execution of key elements of long jumps in both groups of those allowed avoiding or correcting technical errors in time and maintaining an appropriate level of feedback. This supports the thesis of that the use of video contributes to the improvement of motor learning [40, 43].

A careful explanation of the essence of methodological approaches to participants made it possible to form motivations for an effective learning process. This is consistent with the opinion of regarding the rationality of such an approach to increase the efficiency of students [44]. It is known that sportsmen are capable of quick learning exercises from other sports that are complex for character and different in structure from the main motor activity [3]. It also increases students' understanding of the purpose of the curriculum.

The development of professional competence was realized through increasing the awareness of participants in the tasks of the study process. This was facilitated by the implementation of the concept of problem learning, which complements the previous data [35]. The obtained results are consistent with the statement that the method of problem study contributes to motivation and concentration of students [11]. Indicates that this contributes to improving students' understanding of long jump learning issues [36]. Determining the level of physical fitness stimulated participants' self-awareness. This provided an idea of the current level of skills of individuals. Setting the aims

of the study that were characterized by obtaining a real-time result stimulated the interest of participants. This allowed them to achieve their goal. The developed programs corresponded to a competent approach to study: the ability to navigate a problematic issue (different approaches to the study of jump technology); get skills for solving a task (long jump technique). The ability to perform a technically high-quality jump determines the competence of a sports coach (a specialist in physical education). This is consistent with the opinion of the key value of professional competencies [5]. Information about the peculiarities of approaches to learning jumping techniques was contained in theoretical materials that informed students at practical, classroom studies and recommendations for independent work. Therefore, the presented programs don't conflict with the tasks in the process of forming the professional skills of participants of the research.

### Conclusions

The analysis of the data made it possible to determine the strategy for applying the methods of studying the technique of long jumps to combat sports student-athletes. For the first time, a comparison was made of the effectiveness of fundamentally different studying programs for track and field jumps for sub-elite combat student-athletes. The sportsmen of group A (satisfactory physical fitness) needed to coordinate a holistic jump movement from elements of different phases (differentiated method). The participants of group B (high physical fitness) could focus on doing the whole exercise (holistic method). Thus, two fundamentally different programs were presented and their effectiveness was confirmed. We believe that the unsuccessful performance of holistic jumps by students-martial artists of group A would negatively affect the assimilation of the optimal individual technique for performing the jump. But, the developed program made it possible to improve individual phase structural units of long jumps. The implementation of the program by the sportsmen of group B allowed the participants to gain more experience in performing holistic jumps, focusing on improving the result and key motor actions of the holistic jump. Thus, the quality of studying in the technique of jumping of combat sports student-athletes is determined by the current

level of physical fitness and the strategy for using the training program. It is easier for combat athletes with high physical fitness to study the technique of the long jump in a holistic way. This corresponds to the time frame of the educational program. Combat athletes with low physical fitness should use a differentiated training method. For them, it is necessary to specify the criteria for the success of studying the jump technique. At the same time, both long jumps studying programs presented have demonstrated effectiveness. Thus, the differentiation of studying programs, taking into account the specifics of the contingent of student-athletes, makes it possible to increase the effectiveness of studying the long jump technique. The presented programs are recommended for use in the preparation of bachelors in the specialty «Coaching in the chosen sport». In the future, modification and approbation of the presented programs in the studying of student athletes of other sports is required.

**Limitations.** The previous motor experience of the participants in long jump wasn't evaluated. We didn't take into account specialization of single combats. This could affect the features of the manifestation of the level of high-speed and power abilities in jumps. They also didn't take into account the peculiarity of the motor activity of a specific specialization. This could detect motor patterns that are difficult to overcome without using specific influences. There is no retest of physical fitness of participants of the research. This doesn't allow us to state the influence of study programs on the dynamics of its level. Unfortunately, there wasn't enough academic time for this. We plan to take this into account when implementing the noted approaches in the study of other motor actions.

### Conflict of interest

The authors declare that there are no conflicts of interest.

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