

MODERN PROBLEMS OF PERFECTION OF ELITE LIGHT ATHLETIC SPORTSMEN'S TECHNICAL SKILLFULNESS PERFECTION

Kolot A.V.

National University of Physical Education and Sports of Ukraine

Abstract. *Purpose:* perfection of elite sportsmen's technical skillfulness in competition kinds of light athletic. *Material:* the data of more than 60 literature sources were systemized. Expert questioning of 36 coaches, having experience of work with elite sportsmen, was carried out; documents of training process planning were analyzed as well as sportsmen's diaries (n=244). *Results:* we have presented main principles of sportsmen's technical skillfulness perfection and elucidated characteristics of technical training methodic. We have determined main priorities of technical training building for light athletes at every stage of many years' perfection. Dynamic of competition practice volume has been found as well as main requirements to selection of training means of technical orientation. The data of bio-mechanical criteria of sportsmen's technical skillfulness assessment have been supplemented. *Conclusions:* effectiveness of sportsmen's training methodic is determined by realization of previous stages' technical potential in final competition results. It can be achieved by determination of means of and methods of different orientation rational correlation.

Key words: technical skillfulness, technical training, elite sportsmen, training means, sports results, technique of motor actions.

Introduction

At present time winter and summer calendars of events are still widening with increase of starts quantity by individual invitation of sportsmen- leaders of world rating. It permits to perform not less than in thirty competitions during years. Constant desire of high sports results stabilizes possibility of high results. It is connected with excessive nervous-psycho and physical loads, with worsening of technical fitness. All these result in reduction of efficiency in main competitions. Achievements of Ukrainian sportsmen-light athletes significantly lag behind from foreign during several years.

Results of performances at 30th Olympic Games in Beijing (2008) and 31st Olympic Games in London (2012), at world championships 2013 and 2015 showed main drawbacks in training of Ukrainian light athletes. They proved opinion of many specialists that existing system does not correspond to modern tasks of training of elite light athletes [4, 5, 6, 25, 35].

Light athletic is a kind of sports with complex coordination of motor structure and high dynamic loads. High level of world achievements sets difficult task before domestic specialists, which is connected with perfection of technical skillfulness of elite sportsmen. Every new step directly depends on special physical fitness, which is ensured by groups of exercises of different orientation [12, 13, 16, 19, 20].

Technical training requires fulfillment of great scope of exercises with different intensity. Training means shall facilitate perfection of required physical qualities and ability to use them in motor structure of competition exercise [16, 26, 30].

Selection of training means become more and more important. Achievement of higher sports results is connected with demand in fulfillment of such scope of training loads, which would ensure successful performance in one competition exercise. For this purpose it is necessary to use technical means, creating the basis for technical fitness. Such basis increase competition intensity of some characteristics of main exercise [15, 24, 26].

In spite of great practical experience and numerous works on training of elite light athletes, the questions of planning of technically oriented training loads in annual cycles have been regarded insufficiently. There has appeared demand in further perfection of traditional system of technical means and methods' application in annual training cycle, which would ensure high sports results in light athletic.

Considering specific character of the kind of sports and demand to effectively endure maximal load, some principles of methodic of technical means and methods' application in annual training cycle at stage of individual potentials' maximal realization, requires reviewing [14].

Purpose of the research, tasks, material and methods

The purpose of the research is perfection of elite sportsmen's technical skillfulness in competition kinds of light athletic.

The tasks of the research:

1. To study main problems of elite sportsmen's technical skillfulness perfection in light athletic at modern stage.
2. To study specific features of elite sportsmen's technical skillfulness perfection methodic in light athletic.
3. To determine requirements to training means in process of elite light athletes' technical training.

Material and methods: analysis and generalization of special scientific-methodic literature and documents; study and generalization of sports practice advanced experience; pedagogic observations.

For further studying and solution of elite light athletes' technical perfection problem we fulfilled analytical review of scientific-methodic literature (more than 60 sources). The data about volumes of competition practice and technically oriented means at different stages of annual training cycle were generalized. At different stages of many years' perfection the data were insufficient.

At the last stage of the research we conducted analysis of practical experience of leading Ukrainian light athletic coaches: experts' questioning of 36 elite sportsmen's coaches; analyzed technical process planning and coaches' diaries (n=244). Besides, we determined optimal criteria of technical skillfulness assessment.

Results of the research

Technical skillfulness shall be interpreted as perfection of motor component, rationality of technical structure and perfectness in their usage. With functional-structural approach to organization and control over motor actions it is evident that this concept is much wider. It includes structural-technical perfection of motor act and mechanisms of control and regulation of motor actions. All these ensure high final results. From position of requirements of sports actions' extreme mode technical skillfulness shall be understood as perfect mastering of the sports exercises' most rational motor structures with orientation at maximum in conditions of acute sports competition [10]. It is integral conception of theory and methodic of sports training. It is based on such fundamental concepts as sports technique and technical training. It is a result of development of definite light athletic effective technique and successful pedagogic process's application in technical training. Training of high quality results in high technical skillfulness of sportsmen. Such skillfulness ensures high probability of excellent results [3, 8]. With it any competition result is an integral indicator of sportsmen's skillfulness. It as if integrates many of multidirectional factors of training (see fig.1).

High technical skillfulness is a necessary condition of elite sportsmen's training. Development and perfection of technical training in many years' aspect can conventionally be divided into three stages: 1) choice of specialization and initial training; 2) formation of physical fitness and technique of the chosen light athletic kind, in which it is necessary to increase impact of training means on sportsman's organism; 3) development of physical qualities and technical perfection in the chosen light athletic kind, videlicet: further strengthening of technical means' impact on sportsman's muscular-skeletal apparatus [21].

Recent years great positive experience of technical skillfulness perception in light athletic has been accumulated [5, 10, 26]. However, its dynamic requires searching new more effective ways of special technical fitness increase as well as physical qualities development.

At every stage of annual training there are definite tasks. At the beginning of preparatory period it is the task of restoration of already achieved best results of technical fitness. Then it is possible to pass to ensuring higher level of indicators, i.e. to perfection. In competition period of training the main task is maintenance of technical fitness level (which was achieved in preparatory period) and increase of technical and physical potentials' realization level.

At any stage of annual training cycle elite sportsmen's technical skillfulness is perfected in conditions of high intensity of fulfilled exercises. To avoid stresses it is necessary to constantly consider individual features and functional state of sportsman's organism. Besides, in weekly cycle it is necessary to alternate high volume of training work with moderate and low, using variation approach.

Main specific features of perfection of technical skillfulness include: 1) correspondence of means of muscles' local and regional development to main exercise by kinematic and dynamic characteristics; 2) correspondence of muscular work mode in perfection of technical actions to sports functioning; 3) definite correlation of volumes of main, special and special auxiliary exercises' fulfillment [17].

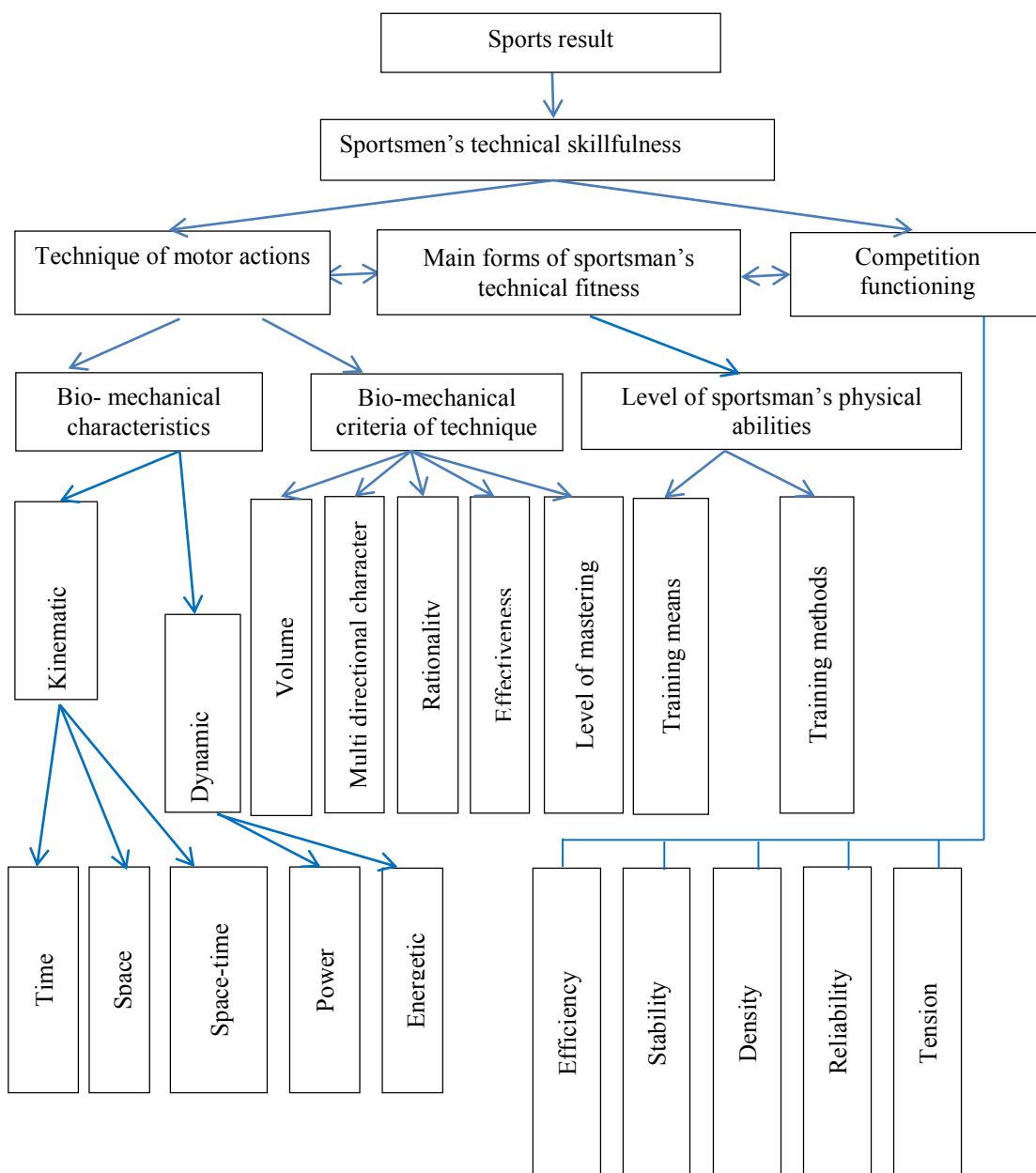


Fig.1. Main structural components of sportsmen's technical skillfulness

Main parameters of special exercises' correspondence to main and competition exercises are the following:

- Power of push off, for which phase duration, force extreme and mean power of push off are the derivatives;
- angle speed values of jerking leg's unbending joints and hip joint' bending joints of waving leg in push offs;
- "zones of working angles" in joints of jerking leg in push offs, whose indicators are minimal joint angle and joint unbending amplitude (especially ankle and knee joints);
- "coordination structure" of exercise, which shall be regarded, coming from demand in observation of the following principles: "dynamic balance", "conjugated development of physical qualities and sports technique's perfection", "functional correspondence of muscles' work when applying special training means" [5, 7, 11].

Discussion

Commonly accepted periodization of sports training, oriented on planned preparation of sportsmen to main starts of season [22, 27, and 29] was conditioned by competitions' system in 1960 – 1970. However, recent decade in light athletic calendar of events has significantly widened and total quantity of international competitions increased

[1, 31, and 38]. It resulted in rising of density and duration of competition season. The strongest Ukrainian sportsmen nearly do not perform in domestic competitions; they compete abroad in series of Grand-prize, “diamond League” and other competitions. If earlier the main purpose of training was to gradually prepare a sportsman for main starts of season, then, now, accent is made on readiness for high results’ achievements in every competition. Sportsmen have to start in average at least once every 7-10 days. In spite of such great changes in calendar of events, traditional structure of annual training cycle construction has still been preserved [2, 19, 26, 33, and 36].

Modern ideas about laws of sports form achievement point at impossibility of its maintenance during all annual training cycle [6, 7, 23, and 37]. Competitions of annual cycle shall be subordinated to achievement of peak of sportsmen’s speed-power, functional, technical-tactic and psychological potentials by the moment of main competitions [28, 32].

Specialists see solution of the problem in rational planning and distribution of competitions in annual training cycle [28]. When planning competitions in year it is necessary to consider unity of light athletes’ training and competition loads in training system. Competition loads shall harmoniously coincide with dynamic of training ones and be an integral unit. Competitions of every training cycle’s stage shall be in compliance with sportsman’s fitness at definite stage of appropriate period. Sportsman’s participation in competitions at different stages shall correspond to the level of his fitness and ability to solve the set tasks. At the beginning of summer competition season some commercial competitions are recommended. When preparing for main year’s competitions starts are of preparatory character and have little psychic tension. Participation in great number of commercial competitions is recommended after Olympic Games and world championships. The existing at present rating system of results’ assessment permits for light athletes, having high places in world rating, to participate in Olympic Games and world championships without preliminary selection. Elite sportsmen have opportunity to purposefully train for main year’s competitions. The rest sportsmen shall show high results in selective competitions.

Usage of individually maximal training and competition loads is one of the most important principles of sports training, which ensure effective formation of long-term adaptation. There are two approaches, supplementing each other, depending on sportsmen’s qualification and fitness, on stage on many years’ training and period of training macro-cycle.

The first approach envisages even increase of volume and intensity of irritators that results in gradual strengthening of impact of sportsman’s organism and planned formation of long term adaptation to impact factors.

The second approach is connected with sharp increasing of loads’ volume and intensity and their high concentration in time. It is connected with deep mobilization of functional reserves of sportsman’s organism. However, it creates pre-conditions for jump-like formation of adaptation processes [7, 28, and 29].

Experience of elite light athletes’ training shows that in existing methodic of sportsmanship’s perfection there is a number of organizational and methodic disadvantages:

1. There is no single opinion of practical specialists about main principles of conceptual apparatus of this field of knowledge. It inserts uncorrectable mistakes in strategy of training in the whole [18].

2. Important aspects of sports’ techniques’ rational examples in different kinds of light athletic have not been sufficiently studied in theory and practice.

3. In methodic provisioning of elite sportsmen’s training process, in most kinds of light athletic main accents are made on increase of functional potentials. There are practically no special recommendations on methodology of technical skillfulness perfection.

4. There is excessive increase of mechanical work’s volume.

5. In special technical training non-specific means, which lost training effect, are used.

Prevailing role of special training means at stage of maximal realization of individual potentials, is conditioned by: 1) loss of informative value of comprehensive or special training means, i.e. reduction of their training effect in connection with sportsman’s high workability; 2) reduction of fitness “transfer” with growth of organism’s functional specialization, when non adequate means of any, even the highest intensity, do not give quantitative increment of the achieved special workability [7].

6. Application of technical training means, which do not correspond to biomechanical structure of competition exercise, in training process [25].

7. Application of technical training means, which do not facilitate realization of accumulated in competitions motor potential.

8. In connection with widening of calendar of events and demand in performances at the highest level for long time, the system of means and methods does not permit to maintain sportsmen's technical fitness for long period of time.

Intensification of elite sportsmen's technical training requires higher level of pedagogic control, which shall be conducted more carefully: from sportsmen's familiarization with new techniques, teaching to their elements and to perfection of technical skillfulness. Such control can be effective only if its structure will include biomechanical criteria as objective indicators of technical skillfulness level: volume, comprehensive character and rationality of technical training; effectiveness of techniques' mastering and skillfulness in it [9, 18, 34].

The received in our research results prove demand in searching of ways for sports' results' rising, connected with perfection of technical skillfulness [18, 28, 31, 32]. When assessing elite light athletes' technical skillfulness it is necessary to consider biomechanical characteristics, biomechanical criteria of motor techniques; level of sportsmen's fitness and indicators of competition functioning.

For further perfection of elite sportsmen's technical skillfulness in light athletic the most important is the search of highly effective means, which would correspond to biomechanical structure of main competition exercise.

Conclusions

1. Technical skillfulness as system property of human motor function has multi-dimensional hierarchic structure. Its level can not be assessed by one of any listed indicators. Just because of this fact its perfection shall be approached from complex systemic positions. It well permit to increase the quality of Ukrainian light athletes' training to the greatest international competitions.

2. For noticeable increase of sportsmen's preparation for the greatest competitions it is necessary to solve all problems of their technical skillfulness perfection.

3. In light athletic not so the scope of loads as their skillful usage has decisive importance, as well as determination of training load's effective content, rational distribution of loads' volumes, selection of the most effective training means and methodic, their places in annual training cycle.

4. Effectiveness of elite sportsmen's training methodic is determined by realization of technical potentials of previous training stages in final result. It can be achieved by determination of rational correlation of multi-directional means and methods. Application of exercises, oriented on perfection of light athletes' high technical fitness, will be the most important.

Acknowledgements

The research has been fulfilled in compliance with combined plan of SRW in sphere of physical culture and sports for 2016 – 2020 of Ministry of education and science of Ukraine by topic "Theoretical-methodic principles of elite sportsmen's technical skillfulness rising in competition exercises (on example of light athletic, winter kinds of sports and bicycle sports)".

Conflict of interests

The authors declare that there is no conflict of interests.

References

1. Alabin VG. K probleme trenirovochnykh zadaniy kak elementa struktury trenirovochnogo processa v sporte [On the problem of training tasks as element of training process structure in sports]. *Teoriia i praktika fizicheskoy kul'tury*, 1996; 12: 30-31. (in Russian)
2. Balahnichev VV, Suslov FP, Shustin BN. Postroenie etapa neposredstvennoj podgotovki vysokokvalificirovannykh legkoatletov k glavnym sorevnovaniiam goda [Building of stage of elite light athletes' direct preparation for main competitions of year]. *Nauchnye trudy VNIIFK*, 1996;1:32-41. (in Russian)
3. Balsevich VK. Ob evoliucionnom podkhode k razrabotke biomekhanicheskikh osnov vysshego sportivnogo masterstva [On evolution approach to working out of biomechanical principles of elite sportsmanship]. *Teoriia i praktika fizicheskoy kul'tury*, 1975; 11: 71 - 74. (in Russian)
4. Balsevich VK. Kontury novoj strategii podgotovki sportsmenov olimpijskogo klassa [Outline of new strategy of Olympic class sportsmen's training]. *Teoriia i praktika fizicheskoy kul'tury*, 2001; 4: 9-10. (in Russian)
5. Bobrovnik VI. *Sovershenstvovanie tekhnicheskogo masterstva sportsmenov vysokoj kvalifikacii v legkoatleticheskikh sorevnovatel'nykh pryzhkakh* [Perfection of elite sportsmen's technical skillfulness in light athletic competition jumps], Kiev: Scientific World; 2005. (in Russian)

6. Bondarchuk AP. *Upravlenie trenirovochnym processom sportsmenov vysokogo klassa* [Control over elite sportsmen's training process], Moscow: Olympia Press; 2007. (in Russian)
7. Verkhoshansky YV. *Osnovy special'noj fizicheskoy podgotovki sportsmenov* [Principles of sportsmen's special physical training], Moscow: Soviet sport; 2014. (in Russian)
8. Donskoy DD. *Zakony dvizhenij v sporte* [Motor laws in sports], Moscow: Physical Culture and Sport; 1968. (in Russian)
9. Donskoy DD, Zatsiorsky VM. *Biomekhanika* [Biomechanics], Moscow: Physical Culture and Sport; 1979. (in Russian)
10. Diachkov VM. *Sovershenstvovanie tekhnicheskogo masterstva sportsmenov* [Perfection of sportsmen's technical skillfulness], Moscow: Physical Culture and Sport; 1972. (in Russian)
11. Diachkov VM. *Celevye parametry upravleniia tekhniko-fizicheskim sovershenstvovaniem sportsmenov, specializiruiushchikhsia v skorostno-silovykh vidakh sporta* [Targeted parameters of monitoring of sportsmen, who specialize in sped-power kinds of sports, technical-physical perfection]. Moscow; 1984. (in Russian)
12. Zotko R. Vzaimosviaz' special'noj silovoj i tekhnicheskoy podgotovki v trenirovke legkoatletov [Interconnection of special power and technical training of light athletes], *Biulleten*, 2000;2(4):205-206. (in Russian)
13. Khomenkov LS. *Kniga trenera po legkoj atletike* [Coach's handbook on light athletic], Moscow: Physical Culture and Sport; 1987. (in Russian)
14. Kolot A. Kontrol' tekhnicheskoy podgotovlennosti kvalificirovannykh prygunov trojnym pryzhkom s razbega na etape maksimal'noj realizacii individual'nykh vozmozhnostej [Control of elite triple jumpers' from run technical fitness at stage of maximal realization of individual potentials]. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2005; 18: 65-79. (in Russian)
15. Korobenko VA. Dinamika pokazatelej special'noj fizicheskoy podgotovlennosti prygunov trojnym pryzhkom s razbega vysokoj kvalifikacii v godichnom cikle podgotovki [Dynamic of special physical fitness indicators in elite triple jumpers from run in annual training cycle]. *Pedagogics, psychology, medical-biological problems of physical training and sports*, 2006; 7: 55-60. (in Russian)
16. Kreer VA. *Trojnoj pryzhok* [Triple jump], Moscow, Physical Education and Sports; 1980 (in Russian)
17. Kuznetsov V.V. Problemy skorostno-silovoj podgotovki kvalificirovannykh sportsmenov [Problems of elite sportsmen's speed-power training], Moscow: Physical Culture and Sport; 1971 (in Russian)
18. Laputin AN. Sovershenstvovanie tekhnicheskogo masterstva sportsmenov vysokoj kvalifikacii [Perfection of elite sportsmen's technical skillfulness], *Nauka v olimpijskom sporte*, 1997; 1: 78-83. (in Russian)
19. Levchenko AV, Matveev AE. Skorostno-silovaia podgotovka prygunov [Sped-power training of jumpers]. *Legkaia atletika*, 1986; 12: 10-11. (in Russian)
20. Ozolin NG, Voronkin VI, Primakov YN. *Legkaia atletika* [Track and field], Moscow: Physical Culture and Sport; 1989. (in Russian)
21. Stryzhak AP, Aleksandrov OI, Sidorenko SP, Petrov VP. *Legkoatleticheskie pryzhki* [Light athletic jumps], Kyiv, Health; 1989. (in Russian)
22. Matveev LP. *Problema periodizacii sportivnoj trenirovki* [Problem of sports training periodization], Moscow: Physical Culture and Sport; 1965. (in Russian)
23. Matveev LP. *Teoriia sporta* [Theory of sports], Moscow: Military Publishing; 1997. (in Russian)
24. Mironenko IN. Evoliuciiia dvigatel'nykh dejstvij v pryzhkovykh lokomociakh cheloveka [Evolution of motor actions in human jump locomotion]. *Nauchnaia konferenciiia "Sovremennyj vzgliad na podgotovku legkoatletov"* [Modern view at light athletes' training], Moscow; 2006. p. 127-148. (in Russian)
25. Mikich MS. Problemi shvidkisno-silovoi pidgotovki v legkoj atletici [Problems of speed-power training in light athletic]. *Naukovo-praktichna konferenciiia z legkoj atletiki* [Scientific-practical conference on light athletic], Lviv; 1999. p. 49-50. (in Ukrainian)
26. Oganjanov AL. *Upravlenie podgotovkoj kvalificirovannykh legkoatletov-prygunov* [Control over training of elite light athletes-jumpers], Moscow: Physical Culture; 2005. (in Russian)
27. Ozolin NG. *Sovremennaia sistema sportivnoj trenirovki* [Modern system of sports training], Moscow: Physical Culture and Sport; 1970 (in Russian)
28. Platonov VN. *Sistema podgotovki sportsmenov v olimpijskom sporte* [The system of preparation of sportsmen in

- Olympic sport], Kiev: Olympic Literature; 2004. (in Russian)
29. Platonov V.N. *Periodizaciia sportivnoj trenirovki* [Periodization in sports training], Kiev: Olympic Literature; 2014 (in Russian)
 30. Popov VB. *Sistema special'nykh uprazhnenij v podgotovke legkoatletov* [System of special exercises in training of light athletes], Moscow: Olympia Press; 2006 (in Russian)
 31. Pyanin AI. *Sportivnaia podgotovka legkoatletov-prygunov* [Sports training of light athletes-jumpers], Moscow: Theory and Practice of Physical Education; 2004. (in Russian)
 32. Razumovsky E. Faktory, opredelaiushchie vysshie dostizheniia legkoatletov [Factors, determining light athletes' highest achievements]. *Legkaia atletika*, 1994; 11: 13-15. (in Russian)
 33. Suslov FP, Shepel SP. Struktura godichnogo sorevnovatel'no-trenirovochnogo cikla [Structure of annual competition-training cycle]. *Teoriia i praktika fizicheskoi kul'tury*, 1999; 9: 57-61. (in Russian)
 34. Fiscalov VD. *Sport i sistema podgotovki sportsmenov* [Sports and system of sportsmen's training], Moscow: Soviet sport; 2010. (in Russian)
 35. Yushkevich TP. Sovershenstvovanie metodiki trenirovki legkoatletov vysokoi kvalifikacii [Perfection of elite light athletes' training methodic]. *Mir sporta*, 2000; 1: 14-16. (in Russian)
 36. Bompa T. *Periodization - Theory and Methodology of Training*. Champaign (IL): Fourth Edition; 1999.
 37. De Vries HA, Housh TJ. *Physiology of Exercise*. Madison: Brown and Benchmark; 1994.
 38. Grosso Marc. Training theory: A primer on periodization. *The Coach*. 2006; 33: 25-33.

Information about the author:

Kolot A.V.: <http://orcid.org/0000-0002-0182-9107>;
ankoll@mail.ru; National University of Physical Education and
Sports of Ukraine; Fizkultury str. 1, Kiev, 03680, Ukraine.

Cite this article as: Kolot A.V. Modern problems of
perfection of elite light athletic sportsmen's technical
skillfulness perfection. *Pedagogics, psychology, medical-
biological problems of physical training and sports*,
2016;2:26–33.

<http://dx.doi.org/10.15561/18189172.2016.0204>

The electronic version of this article is the complete one and can be
found online at: <http://www.sportpedagogy.org.ua/html/arhive-e.html>

This is an Open Access article distributed under the terms of the
Creative Commons Attribution License, which permits unrestricted
use, distribution, and reproduction in any medium, provided the
original work is properly cited
(<http://creativecommons.org/licenses/by/4.0/deed.en>).

Received: 10.02.2016

Accepted: 26.02.2016; Published: 28.02.2016