

## INFLUENCE OF SKILLS' TRAINING METHODIC WITH THE APPLICATION OF INTERDISCIPLINARY CONNECTIONS ON MOTOR FITNESS OF SENIOR PUPILS IN LIGHT ATHLETIC

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**Abstract.** *Purpose:* determination of influence of technologies of motor and intellectual aspects' impact on process of basic light athletic movements' development. *Material:* in the research 2 groups of pupils participated: control (n = 22 – girls, n=34 – boys) and experimental (n = 21 – girls and n=34 – boys). *Results:* we have shown comparison of basic light athletic movements and movements in wildlife. We compared movements in sports with their physical analogues. Main characteristics of basic movements in light athletic have been defined. Methodic of rising of theoretical knowledge level about light athletic exercises has been presented. *Conclusions:* it is recommended to apply complex methodic of motor actions' training. The methodic combines practical trainings with theoretical knowledge about main laws of movements in wildlife.

**Key words:** abilities, skills, light athletic, pupils, methodic.

### Introduction

At present time in education, in field of physical education disunity of disciplines has been becoming one of reasons of school leavers' fragmentary world vision [2; 7; 17; 19; 20]. In modern world tendencies to economic, cultural and informational integration prevail. In this connection independence of disciplines and their weak interconnection give birth to serious difficulties information of pupils' holistic picture of world. They prevent from natural perceiving of general culture and physical culture [21; 23; 25; 26; 27].

Importance of integration of different educational aspects is witnessed by assertions of pedagogic classics. Great didactic Yan Amos Komensky [13] underlined that everything is interconnected. That is why all disciplines shall be taught in the same interconnection.

I.G. Pestalozzi [18], basing on large didactic material, opened diversity of academic disciplines' interconnections. He based on requirement, that is was necessary to bring all subjects in ones mind into interconnection. It is conditioned by connection of these subjects in the nature. Pestalozzi noted special danger of separation of one discipline from other.

In modern conditions this old pedagogic problem acquires new interpretation. Traditional "mono-logic" system in education has nearly lost its practical effectiveness. In modern school academic disciplines are of "competing" character. Every discipline is in opposite to other, as if it pretends to be more significant than other [29; 31]. Every school discipline is by itself a set of pieces of information from certain field of knowledge. That is why it can not pretend to give systemic description of reality [2; 28; 30; 32; 33; 34].

Teachers notice that pupils master fragmentary knowledge. Pupils have incomplete picture of the world and its laws [17; 23; 25]. Such not systemic knowledge spoils thinking and distorts attitude to the world and to a person; pupils can not connect newly studied discipline with mastered earlier and use knowledge of other disciplines at lesson. For teachers it is also difficult to apply correctly knowledge from other disciplines owing to a number of reasons. Knowledge of allied disciplines either already has been forgotten or has been unknown owing to their novelty; there is no information about achievements in boundary sciences; there are no methodic abilities. Together with mastering of ready differentiated knowledge pupils master reproductive character of thinking. It is not desirable in context of modern requirements. There occurs duplicating of one and the same material in academic programs and in manuals. Pedagogues, working in one class do not have joint educational policy; they do not act as single collective. Pedagogues compete and try to "re-switch" pupils' attention and interest to own discipline.

All listed above statements also belong to field of physical education. In other fields problem of interdisciplinary connections has already been raised partially. However, in field of physical education this problem is only at the beginning of working out.

At present time the range of means and methods, offered for application in pupils' physical education has expanded. For example in works by O.V. Antonov [1] effectiveness of modified means of hiking and team building is

shown. Problem of interdisciplinary connections is elucidated by O.A. Chernoyarova (2001) [25]. The author analyzes problem of interdisciplinary connections in different fields of education. The author points at demand in development of interdisciplinary connections in training of physical culture instructors. She also shows importance of different educational aspects', connected with training of physical education specialists, integration. However, problem of such integration's realization in system of physical education has not been studied yet.

#### **Purpose, tasks of the work, material and methods**

*The purpose of the work:* determination of influence of technologies of motor and intellectual aspects' impact on process of basic light athletic movements' development.

*The methods of the research:* theoretical analysis and generalization of special literature, pedagogic testing, method of experts' assessment, pedagogic experiment, methods of mathematical statistic.

For determination of influence of authors' methodic for training of senior school girls' motor skills at curriculum and sport circles' trainings of light athletic we conducted forming pedagogic experiment. This experiment was conducted from September 2013 to May 2014. Control (n = 22 – girls and n=34 – boys) experimental and (n = 21 –girls, n=34 – boys) groups included senior pupils of secondary school of settlement Mu'tah, Al-Karak, Jordan.

#### **Results of the research**

In the research we used conceptual principles [8; 11; 16; 18; 20] and analysis of modern tendencies in education. We worked out methodic of motor skills' training for schoolchildren at light athletic lessons with application of interdisciplinary connections, information and interactive technologies.

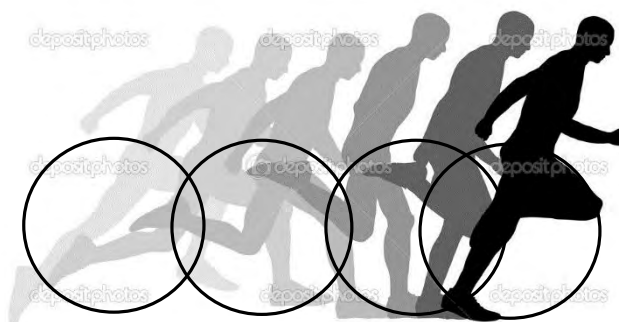
Holistic approach is the main direction in our methodic of light athletic motor skills' training. It implies mastering of basic movement from light athletic on the base of analogies with rational and economic movement in animate nature and with laws of mechanic. It conditions application of knowledge from physics, biology, physiology, bio-mechanic for receiving of more complete idea about correct technique of light athletic movements. Besides, application of information technologies permits to make training process more effective through influence on supreme sectors of central nervous system [3; 4; 5; 6; 14; 15]. Exactly such approach is the most acceptable for training of pupils to motor actions. It is conditioned by more expressed cognitive and associative forms of teaching. That is why application of mind activation means [9; 10; 11; 12] is one of the most effective methods of improvement of quality of education.

In our approach we used multiple repetitions of actions with explanation of physiological and bio-mechanical principles of movements (run, jumps, throws). It implied usage of analogies from biology and physics. This information was delivered in oral and printed forms, as methodic recommendations, visual aids.

Let us regard application of interdisciplinary connections and information technologies in training of light athletic elements' technique on example of run (jumps) and throws. As the basis of interdisciplinary connections we took approach, delivered in works by N. Romanov [22]. This approach is recommended by the author for mastering of technique of the so-called "postural method of run". It implies increase of effectiveness of run technique's mastering at the account of mastering of main body positions, as well as ability to tense and relax required muscular groups. For realization of this idea the author resorts to analogies from animate nature, laws of physics, moving of wheel on inclined plane.

Also key moments of run correct technique, with the help of visual aides from mathematic, physics, biology, were explained. When explaining of correct body position of a runner in different moments of time and importance of balance interdisciplinary connections were used: with biology – analogy with running of cheetah; with physics – spring's operation. Visual aids of body rational position in moment of balance were applied. When explaining demand in usage of gravitation force during running interdisciplinary connections with physics were used (principle of free falling body). It permitted to more efficiently form ability to change rationally and economically points of support during running.

When explaining demand in ability to rationally and economically change points of support during running analogies with biology (run of animals) were used; with physics (economical principle of wheel's moving) [22]. Fig.1 is an illustration of "principle of wheel" of legs' movements during run. This principle permits to keep practically straight line of gravity center's moving. Besides, visual aids on run correct technique were demonstrated. With such run human center of gravity practically does not oscillate. It is achieved with movement of legs by principle of wheel, (see fig. 2). With it, visual aids on animals run were demonstrated. They showed character of cheetah's run and other animals. Their run is characterized by absence of gravity center's oscillations. In movements of animals' paws one can notice rotary motion. Further, other components of run correct technique were explained: importance of legs' work in hip joints; ability to use inertia and gravity forces; correct placing of foot.



*Fig.1. Illustration of “principle of wheel” in technique of run*  
[<http://ru.depositphotos.com/21370889/stock-photo-running-man.html>]



*Fig. 2. Video gram of run technique of elite sportsman*  
[<http://n-shipilov.narod.ru/Markin.htm>; [http://omskathletics.hoha.ru/book/555/4\\_1.shtml](http://omskathletics.hoha.ru/book/555/4_1.shtml)]

For training of throw technique we took as the basis methodic of throw initial training in game kinds of sports by Zh. L. Kozina [8]. In this methodic importance of forces vectors' addition for turn-by-turn switching of all muscles is explained.

At informatics, geometry and biology lessons pupils watched educational cartoon. It illustrated analogy between laws of bio-mechanical addition of forces with ball passing and laws of ants' forces' interaction during carrying burden. Then, cartoon illustrated laws of forces addition in any collective unidirectional action on example of tale “Turnip” [8]. In our opinion creation of holistic idea of movement, profound understanding of movement's rational technique' physical principles are rather effective approaches. This material was offered to pupils with the help of modern informational (multi-media) technologies. It facilitated efficiency of its perceiving.

Results of application of the worked out methodic of run technique in boys' experimental group were assessed by experts. We detected confident increase of experts' assessment of movements' technique and theoretical knowledge in experimental group of boys (see table 1). In this group experts' assessment of jump technique before experiment witnesses about extremely low level of skills (see table 1). In control group changes are not confident (see table 1). It should be noted that there are confident distinctions between results of control and experimental groups after experiment (see table 1).

After experiment experts' assessment of girls' jumps was confidently better (see fig.3). Analogous changes were characteristic for other abilities and skills of this group's girls (see fig.4).

Table 1

Indicators of motor abilities and skills of control (n=34) and experimental groups' pupils before and after experiment (boys)

Indicators of testing	Time of testing	Group	$\bar{x}$	S	P BE-AE	P CG-EG, BE	P CG-EG, AE
1	2	3	4	5	9	11	13
Experts' assessment of jumps, points	BE	EG	2.98	0.72	0.02	0.97	0.03
	AF		4.23	0.67			
	BE	CG	2.99	0.82	0.43		
	AF		3.02	0.85			
Experts' assessment of run technique, points	BE	EG	3.25	0.53	0.00	0.83	0.00
	AF		4.36	0.56			
	BE	CG	3.34	0.52	0.31		
	AF		3.45	0.56			
Experts' assessment of throw technique, points	BE	EG	3.04	0.64	0.01	0.17	0.00
	AF		4.15	0.61			
	BE	CG	3.05	0.56	0.57		
	AF		3.08	0.52			
Theoretical knowledge, points	BE	EG	22.6	5.43	0.02	0.47	0.02
	AF		46.5	6.54			
	BE	CG	24.5	5.34	0.35		
	AF		29.8	5.72			

Notes: CG – control group; EG – experimental group; BE – before experiment; AE – after experiment.

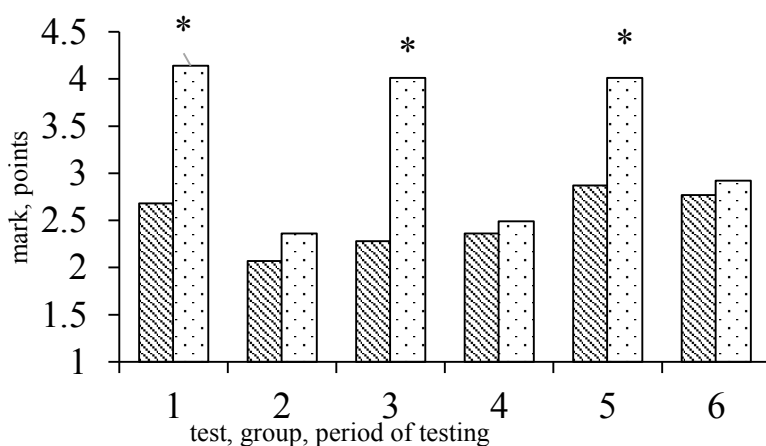


Fig. 3 Results of experts' assessment of motor skills of experimental (n=21) and control (n=22) groups' pupils before and after experiment (girls):

- 1 – Experts' assessment of jumps technique, experimental group;
- 2 – Experts' assessment of jumps technique, control group;
- 3 – Experts' assessment of run technique, experimental group;

- 4 – Experts' assessment of run technique, control group;  
 5 – Experts' assessment of throw technique, experimental group;  
 6 – Experts' assessment of throw technique, control group;  
 \* – differences are confident at  $p < 0.05$ ;

▨ - before experiment;  
 ▩ - after experiment

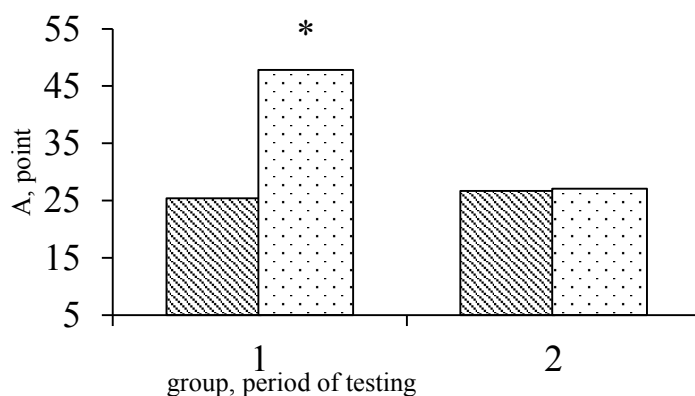


Fig. 4. Level of theoretical knowledge on light athletic of experimental ( $n=21$ ) and control ( $n=22$ ) groups' pupils before and after experiment (girls):

- 1 – Experimental group;  
 2 – Control group;  
 \* – differences are confident at  $p < 0.05$ ;

A – теоретические знания;

▨ - before experiment;  
 ▩ - after experiment

In control group of girls such changes were not confident (see fig.2). Control and experimental girls' groups became confidently different by all tested parameters after experiment (see fig. 1, 2).

Thus, application of worked out training methodic facilitates improvement of motor fitness indicators. It is an important aspect of schoolchildren's physical education. Positive effect of application of this methodic is ensured by adequate selection of exercises and expansion of theoretical aspect.

### Discussion

Our research was conducted within the frames of classic didactic principles [2; 3; 4; 5; 6] and modern pedagogic tendencies [17; 23; 25]. Development of theory of interdisciplinary connections was influenced by processes of differentiation and integration of sciences. In the whole idea of interdisciplinary connections was deduced by K.D. Ushinsky [24] from general problem of systemic character of teaching. The author notes that it is important to systemize knowledge in process of their receiving. The scientist compares fragmentary and rambling knowledge with pantry. In this pantry there is disorder and owner can not find anything. At the same time the scientist underlined that system without knowledge is like shop with inscriptions on empty boxes [24].

Usage of interdisciplinary connections by a teacher makes the whole process of teaching easier. Children acquire interest and system of their knowledge forms. It helps to rise to high philosophical and logic abstractions.

K.D. Ushinsky [24] pointed that only if teachers' work is coordinated it is possible to overcome chaos in pupil's head. Teachers shall take care of their disciplines and of rising generation's general progress. Separation of knowledge can result in "dead" state of ideas and conceptions, when "they are lying in head like on cemetery and do not know about existence of each other" [24, pg. 177]. The author found distinctions between system of knowledge mastering under scholastic separation of disciplines and system of knowledge on the base of common ideas and facts, with usage of interdisciplinary connections between them. With it K.D. Ushinsky [24] thought that learning is a cognitive process. Its main task is determined by formation of scientific knowledge and, at the same time, by process of development of pupils' mental abilities. Just in process of cognition and development interaction of thinking, memory and attention occurs. Thus, holistic and systemic knowledge is formed. It facilitates perfection of learning process. In the scientist's opinion

connections between disciplines are embedded in general conceptions of different sciences. Besides special conceptions, in every science there are general conceptions, common for many and even for all sciences [24]. Therefore, connection between general conceptions and their development in school disciplines has a potential for expansion and deepening of pupils' knowledge. It is also required for formation of world vision system in general.

It should be noted that our work showed effectiveness of application of methodic, which combines differently oriented disciplines. It increases effectiveness of their mastering through creation of single idea about different processes in animate and inanimate nature. These processes are realized in human rational movements.

### **Conclusions**

1. We have worked out methodic for training of senior pupils motor skills at light athletic lessons with application of interdisciplinary connections and informational technologies. Holistic approach is the main direction of motor skills and abilities' development. It implies mastering of light athletic basic movements on the base of analogies with rational and economic movements in animate nature and with laws of physics. It conditions receiving of more complete ideas about light athletic correct technique.

2. We have shown that application of the worked out methodic of motor actions' training facilitates improvement of motor fitness's indicators. Level of theoretical knowledge also confidently rises. Positive effect of application of this methodic is ensured by adequate selection of exercises and expansion of theoretical aspect. It includes interdisciplinary connections and informational technologies.

In prospects of further researches it is suggested to perfect the methodic of pupils' skills' formation with integral influence of interdisciplinary connections and informational technologies.

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- Scientific-research work for 2013-2014 “Theoretical-methodic principles of application of informational, pedagogic and medical-biological technologies for formation of healthy life style” (state registration № 0113U002003)
- Scientific-research work for 2015-2016 “Theoretical- methodic principles of application of informational, pedagogically, medical biologically oriented means for motor and mental development and for formation of healthy life style”.

### **Conflict of interests**

The authors declare that there is no conflict of interests.

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