

## APPLICATION OF INTERDISCIPLINARY CONNECTIONS AND INFORMATION TECHNOLOGIES FOR DEVELOPMENT OF MOTOR SKILLS IN LIGHT ATHLETIC OF GIRLS – SENIOR FORM PUPILS

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**Abstract.** *Purpose:* to work out and substantiate technologies of motor and intellectual aspects' integral impact on process of training of light athletic' throws and run techniques of 15-16 years old girls. *Material:* in the research 2 groups of pupils participated: control group (n = 22) and experimental group (n = 21). *Results:* Methodic of run, jumps and throws techniques' training of senior school girl-pupils has been worked out. The methodic implies mastering of basic light athletic movements on the base of analogies with rational and economic movements in animate nature and laws of mechanic It conditions application of knowledge from physics, biology, mathematic for receiving of more complete understanding of light athletic movements' correct technique. *Conclusions:* we have shown that application of interdisciplinary connections permits to make the process of movements' training more effective in comparison with mastering material of purely physical education.

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

### Introduction

At present, in education there is a problem of absence of interconnection between studying of different disciplines: different school curriculum subjects are delivered without interconnection between them. As a result pupil receives systemless, fragmented knowledge, which turn out to be useless in practice and are quickly forgotten after leaving school [16; 22; 24]. The most separated is physical education. Physical education is a “counter-weight” to theoretical disciplines in school curriculum, not envisaging cognitive functioning [1; 15; 18; 19; 25; 26]. However, application of cognitive and associative spheres in any kind of functioning, including physical education, facilitates creation of holistic understanding of action. It improves effectiveness of motor skills' mastering and effectiveness of mastering of knowledge in other subjects [2; 6; 7; 13; 14].

In this connection it is necessary to work out approaches to physical education teaching, which would imply creation of holistic idea about movement, deep understanding of rational movements technique's physical principles [20; 27; 29; 32; 33]. Approaches of such orientation are rather effective; however, they practically have not been worked out for physical education and are not used in it by the present time [28; 30; 31]. That is why the problem of methodic' working out for schoolchildren's motor actions' training is urgent and important. It is conditioned by the following: integral combination of knowledge from different fields; creation of holistic idea about movement; enriching of theoretical knowledge with practical realization in the field of motor actions.

Analysis of problems in schoolchildren's physical education is present in many works that also witnesses about importance of this problem. The circle of the regarded problems is rather wide. In work by R. Podstavka et al. (2014) [25] physical education of rural schoolchildren are regarded. The authors note that only insignificant percentage of pupils participated in out-of-school sport trainings and other physical exercises, while relatively high percentage of children pay much of their free time to watching TV, DVD or computer games. The researches of R. Podstavka and K. Boryslavska (2014) [18] showed that the highest quantity of differences between results of individual motor tests in reaching of the best results were in schoolchildren, who were trained by qualified instructors. R. Podstavka et al. (2013) [26] showed that factors of secondary school's location and type differentiated insignificantly motor level of first year students. Weak interaction of the used factors was a result of leveling of distinctions and barriers between urban and rural schools.

The problem of interdisciplinary connections was elucidated by O.Ya. Chernoyarova (2001)[24]. The author analyzes problem of interdisciplinary connections in different fields of education. She pointed at demand in development of interdisciplinary connections in training of physical culture teachers. She sowed that it is necessary to integrate different educational aspects, connected with training of physical education specialists. However, realization of such integration in system of physical education in school has not been studied yet.

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

*The purpose of the work* is to work out and substantiate technologies of motor and intellectual aspects' integral impact on process of training of light athletic' throws and run techniques of 15-16 years old girls.

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

For determination of influence of authors' methodic on development of senior form girl-pupils' motor skills at academic and circle light athletic trainings we conducted forming pedagogic experiment (in period from September 2013 to May 2014). Control (n = 22) and experimental (n = 21) groups included girl pupils of senior forms of secondary school (Mu'tah, Al-Karak, Jordan).

### **Results of the research**

On the base of theoretical principles [8; 9; 10; 11; 21] we worked out methodic of motor skills' training for senior pupils at light athletic lessons with application of interdisciplinary connections, information and interactive technologies. In our methodic, holistic approach is the main direction of motor skills' development at light athletic trainings. It implies mastering of light athletic basic movements on the basis of analogies with rational and economic movements in animate nature and laws of mechanics. It conditions application of knowledge from physics, biology, mathematic for receiving of more complete understanding of light athletic movements' correct technique. Besides, application of information technologies permits to improve effectiveness of training process owing to impact on supreme sectors of central nervous system. Just such approach is the most acceptable for motor actions' training of senior school's pupils. In senior school age cognitive and associative forms of learning are more expressed. That is why application of mind activating means is one of the most effective ways to improvement of quality of teaching.

These principles are realized in offered by us methodic of motor skills' training with application of interdisciplinary connections and information technologies, worked out for pupils of senior forms. Such approach meant that with pupils' mastering of run, jumps and throws multiple repetitions of actions was the methodic' approach and physiological, bio-mechanical principles of movements (run, jumps, throws) were explained. It implied application of analogies from biology and physics. Such information was delivered in oral form and in form of printed recommendations, methodic literature, video-aids and etc.

Let us regard application of interdisciplinary connections and information technologies in training of techniques of light athletic elements on example of run (jumps) and throws. As the basis of interdisciplinary connections we took approach, delivered in works of N. Romanov [21]. The author recommends such approach for mastering of technique of the so-called "postural method of run", implying improving of run technique's mastering owing to training of main body positions, ability to strain and relax required muscles. For realization of this idea the author uses analogies from animate nature, laws of physics, moving of wheel on inclined surface and so on.

For training of throws' technique we took as the basis methodic of initial training of throws in game kinds of sports, offered by Zh.L. Kozina [7]. In this work, with the help of analogies from animate nature demand in adding of all force-vectors for turn-by-turn switching of all muscles in is explained. At informatics, geometry and biology lessons pupils watched educational cartoon, in which there was analogy for rules of vectors' addition as well as for laws of bio-mechanical addition of forces when passing ball, laws of forces' interaction of ants, when they drag wear; laws of forces' addition in any collective single-directed action on example of tale "Turnip" [7].

As analogy from animate nature we supplied example with collective dragging wear by ants, when vectors of all ants' forces are added. It was shown that ants can drag wear quickly to the required place only adding their forces. In analogous way muscles can fulfill strong and accurate action only with agreed work. From this point of view when passing ball it is purposeful to switch in work the biggest muscles, i.e. lower limbs' muscles. It ensures speed-power aspect when fulfilling the given technique [7]. As analogy example from tale "Turnip" was supplied. In the tale vectors of all forces (i.e. "grandpa", "grandma", "granddaughter" and so on) added and "turnip was extracted" [7]. This material is delivered as cartoon, in which material of geometry, physics, biology and physical culture is combined. It strengthened pupils' understanding of material. This material was offered with the help of modern (multi-media) technologies that increased effectiveness of its perceiving.

In our opinion such approach conditions creation of holistic idea of movement, deep understanding of movement's physical principles and rational technique. Its effectiveness was proved by the conducted research.

Application of the worked out methodic resulted in registration of confident changes in indicators of girls' motor fitness in the following tests:

- "Long jump from the spot, cm" (141.4±5.23 cm before experiment and 155.7±4.62 cm after experiment, t=3.04, p<0.01),

- “Long jump from run, cm” (240.3±9.25 cm before experiment and 265.5±8.96 cm after experiment,  $t=2.76$ ,  $p<0.03$ ) (see fig. 1).
- “3×10 m run, sec.” (11.2±0.66 sec. before experiment and 10.4±0.45 sec. after experiment,  $t=5.24$ ,  $p<0.001$ ),
- “30 m run, sec.”, (6.34±0.07 sec. before experiment and 5.94±0.07 sec. after experiment,  $t=2.59$ ,  $p<0.05$ ),
- “60 m run, sec.”, (11.51±0.22 sec. before experiment and 11.04±0.17 sec. after experiment,  $t=2.76$ ,  $p<0.05$ ) (рис. 2),
- “1000 m run, min.”, (8.78±0.75 min. before experiment and 7.56±0.85 min. after experiment,  $t=2.47$ ,  $p<0.05$ ) (see fig. 2),
- “Ball throw, m.” (15.24±2.13 m before experiment and 17.35±2.08 m after experiment,  $t=2.25$ ,  $p<0.05$ ) (see fig. 2).

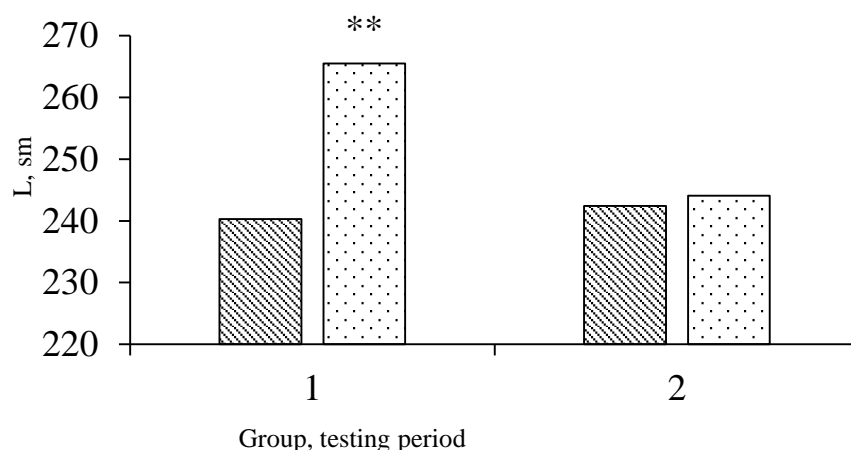


Fig.1. Results of test “Long jump from run” of experimental group pupils ( $n=21$ ) and control group ( $n=22$ ) before and after experiment (girls):

1 – Experimental group; 2 – Control group; \*\* – differences are confident with  $p<0.01$ ; L, cm – result of run jump, cm;

▨ - before experiment;  
▤ - after experiment;

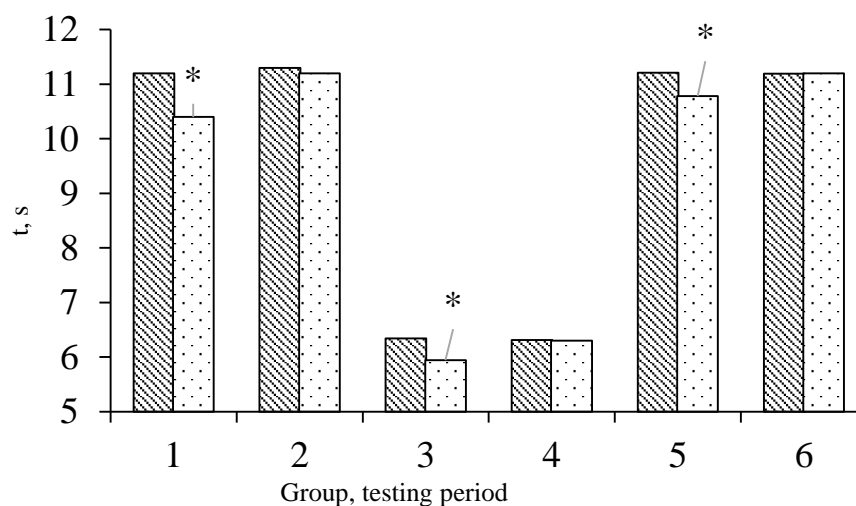




Fig.2. Results of test run tests of experimental group pupils ( $n=21$ ) and control group ( $n=22$ ) before and after experiment (girls):

1 – 3×10 m, Experimental group;  
2 – 3×10 m, Control group;  
3 – 30 m run, Experimental group;  
4 – 30 m run, Control group;  
5 – 60 m run, Experimental group;  
6 – 60 m run, Control group;

\* – differences are confident with  $p < 0.05$ ;

t, s – run result, sec.;

-  - before experiment;  
 - after experiment.

The received results show correctness and purposefulness of application of motor skills training methodic with the help of interdisciplinary connections and information technologies at light athletic lessons of senior forms' girl-pupils. In control groups such changes are not confident ( $p > 0.05$ ). It should also be noted that control and experimental groups confidently did not differ before experiment ( $p > 0.05$ ). After experiment groups became confidently different by all tested parameters ( $p < 0.05$ ;  $p < 0.01$ ;  $p < 0.001$ ) (see figs. 1, 2).

Thus, application of the worked out methodic of movements skills' training at light athletic lessons of senior forms' girl-pupils facilitates improvement of motor fitness indicators. Positive effect of methodic' application is ensured by adequate selection of exercises and expansion of theoretical aspect, which included interdisciplinary connections and informational technologies.

### **Discussion**

Our research has been conducted in the frames of classic didactic principles and up-to-date pedagogic tendencies. Progress of theory of interdisciplinary connections was influenced on by processes of sciences differentiation and integration. Even outstanding pedagogues of 16-18<sup>th</sup> centuries Yan Amos Komensky [12], John Lock [3], Johann Henry Pestalozzi [17], Johann Friedrich Herbert [4], Friedrich Adolf Wilhelm Disterweg [5] to certain extent pointed at malignancy of regarding of phenomena and processes in isolation. In their works they reflected demand in interaction between nature and studied subjects. In particular, Y.A. Komensky said that all must be taught in interconnection [12]. His idea implied setting of interconnection between academic subjects. It must facilitate formation of students' system of knowledge and ensure wholeness of teaching process. In work "Great didactic"[12] Y.A. Komensky wrote that nobody can be given education on the base of any one separate science, independently on other sciences. In his opinion interdisciplinary connections can save students from constant forgetting of the studied and give start to active creative functioning of students themselves in educational process.

However, at present time idea of interdisciplinary connections yet has been remaining not realized. Our work opens ways to realization of interdisciplinary connections in sphere of motor actions training. Realization of this work is becoming still more realistic in connection with usage of multi-media technologies.

Our research is experimental proof and practical realization of views of classic pedagogues on teaching process. Outstanding English philosopher and pedagogue J. Lock [3] in his work "Speculations about education" opened idea of generalized cognition as "method of sinking into truth". His idea is connected with definition of content of education. For example, one academic subject shall be filled with elements and facts from other and general education shall be combined with applied one [3].

J.G. Pestalozzi [17] in theory of developing teaching opened all diversity of interconnection of junior school's academic subjects. The author wanted to ensure system of pupils' knowledge about the world. He pointed at demand in bringing inside own mind all actually interconnected between each other subjects in connection, in which they are in animate nature [17]. The scientist warned about danger of subjects' separation one from other, especially in senior forms.

Exclusive attention to realization of interdisciplinary connections in teaching was paid by A. Disterweg [5]. He included two kinds of connections in his classification: connection between allied academic subjects and connection between subjects of different teaching cycles. From this point of view we offered methodic, which realizes connections between subjects of quite different teaching cycles (humanitarian, natural and practical, like physical education).

According to K.D. Ushinsky [23], interdisciplinary connections are based on different associative connections and can be classified by similarity, opposite, time and oneness of place. His thoughts about world-vision role of interdisciplinary connection, forming of students' clear, full, holistic ideas about existing real world are especially significant for modern educational system. Knowledge and ideas in sciences shall be naturally built in light and expanded vision of world and life [23].

It should be noted that our work has shown effectiveness of this methodic application. This methodic combine differently oriented subjects and increase effectiveness of their mastering by creation of single idea about different processes in animate and inanimate nature. These ideas are realized in human rational movements.

### **Conclusions:**

1. Methodic of senior girl-pupils' motor skills' training at light athletic lessons with the help of interdisciplinary connections and information technologies has been worked out. Holistic approach is the main direction of motor skills' training in this methodic. It implies mastering of basic movements on the base of analogies with rational and economic movements in animate nature and laws of mechanics. It conditions receiving of more complete understanding of movements' correct technique.

2. We have shown that application of interdisciplinary connections and information technologies increase effectiveness of training process in comparison with mastering only physical education material. Application of our methodic of motor skills' training during 1 academic year resulted in confident improvement of pedagogic tests' results for experimental group girl-pupils' motor fitness.

*The prospects of further researches* imply perfection of methodic of schoolchildren's skills with the help of integral impact of interdisciplinary connections and information technologies.

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#### **Conflict of interests**

Authors declare that there is no conflict of interests.

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