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INFLUENCE OF COORDINATION EXERCISES ON ELEMENTARY SCHOOLCHILDREN WITH MENTAL RETARDATION

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Abstracts

Novelty. The investigators have established that children with mental retardation consist of one fifth from all elementary schoolchildren. It's proved the novelty of problem and necessity to find of effective ways for its solution. **Purpose of research** – to show the effectiveness of influence of coordination exercises on coordination skills, psychiatric processes and qualities of elementary schoolchildren with mental retardation. **Methods of Research.** It was used theoretical, empirical, statistical methods of investigation. The research was carried out during 2012–2016 years and divided into four stages: analytico-ascertaining, searching, formating and synthesis. Research was done in Lutsk educational and rehabilitation centre. **Results of Research.** It was made methods for teaching of elementary schoolchildren with mental retardation to coordination exercises. Methods consists of two blocks – psychological and physical. Psychological block contains such processes and properties: visual and listening memory, figurological and visually active mentation. Physical block consists of such coordination skills: possibility to estimate and regulate dynamic and temporal parameters of movement, space orientation, static and dynamic stability. Means which are used for these methods are divided into common and special. The peculiarity of special means was execution conditions which influence on development of coordination skills, psychological processes and properties effectiveness. **Conclusions.** It was proved the effectiveness of experimental methods. Statistical significance changes of self-exiting operative visual and hearing memory, fugurological and visually active mentation were stated. It was improved the capacity to estimation and regulation of spacotemporal and dynamic parameters of movements, static and dynamic stability.

Key words: mental retardation coordination exercises, methods, elementary school age.

Олег Тучак. Вплив координаційних вправ на учнів молодшого шкільного віку із затримкою психічного розвитку. Актуальність. Дослідниками встановлено, що діти із затримкою психічного розвитку становлять одну п'яту частину від загальної кількості дітей, які йдуть до першого класу. Це свідчить про актуальність проблеми й необхідність пошуку ефективних шляхів для її розв'язання. **Мета роботи** – обґрунтувати ефективність впливу координаційних вправ на координаційні здібності, психічні процеси та властивості учнів молодшого шкільного віку із затримкою психічного розвитку. **Методи дослідження.** Використано теоретичні, емпіричні, статистичні методи дослідження. Дослідження відбувалося впродовж 2012–2016 рр. і реалізовувалося у чотири етапи: аналітико-констатувальний; пошуковий; формувальний та узагальнювальний. Дослідницько-експериментальну роботу здійснювали на базі Луцького навчально-реабілітаційного центру. **Результати роботи.** Розроблено методика навчання координаційних вправ учнів молодшого шкільного віку із затримкою психічного розвитку. Методика складається з двох блоків – психічного та фізичного. Психічний блок містить такі процеси та властивості: зорова й слухова пам'ять, образно-логічне та наочно-дійове мислення. До фізичного блоку увійшли такі координаційні якості: здатність до оцінки та регулювання динамічних і часових параметрів руху, орієнтування в просторі; рівновага статична й динамічна. Засоби, які використовувалися під час реалізації методики поділялися на загальні та спеціальні. Особливістю спеціальних засобів були умови їх виконання, які підібрані таким чином, щоб як найефективніше сприяти розвитку координаційних здібностей, психічних процесів і властивостей. **Висновки.** Підтверджено ефективність експериментальної методики. Виявлено статистично значимі зміни за мимовільним оперативним зоровим та слуховим запам'ятовуванням, образно-логічним і наочно-дійовим мисленням. Покращено здатність до оцінки й регуляції просторово-часових та динамічних параметрів рухів, стійкість рівноваги статичної та динамічної.

Ключові слова: затримка психічного розвитку, координаційні вправи, методика, молодший шкільний вік.

Олег Тучак. Влияние координационных упражнений на детей младшего школьного возраста с задержкой психического развития. Актуальность. Исследователями установлено, что дети с задержкой психического развития составляют одну пятую часть от общего количества детей, которые идут в первый класс. Это является свидетельством актуальности проблемы и необходимости поиска эффективных путей для ее решения.

Задача работы – обосновать эффективность влияния координационных упражнений на координационные способности, психические процессы и свойства учащихся младшего школьного возраста с задержкой психического развития. **Методы исследования.** Использованы теоретические, эмпирические, статистические методы исследования. Исследование происходило на протяжении 2012–2016 гг. и реализовывалось в четыре этапа: аналитико-констатирующий, поисковый, формирующий и обобщающий. Опытнo-экспериментальную работу осуществляли на базе Луцкого учебно-реабилитационного центра. **Результаты работы.** Разработана методика обучения координационных упражнений учащихся младшего школьного возраста с задержкой психического развития. Методика состоит из двух блоков – психического и физического. Психический блок содержит такие процессы и свойства: зрительная и слуховая память; образно-логическое и наглядно-действенное мышление. К физическому блоку вошли такие координационные качества, как способность к оценке и регулированию динамических и временных параметров движения, ориентировка в пространстве; равновесие статическое и динамическое. Средства, которые использовались при реализации методики, делились на общие и специальные. Особенностью специальных средств были условия их выполнения, которые подобраны таким образом, чтобы наиболее эффективно содействовать развитию координационных способностей, психических процессов и свойств. **Выводы.** Подтверждена эффективность экспериментальной методики. Выявлены статистически значимые изменения по произвольным оперативным зрительным и слуховым запоминаниям, образно-логическому и наглядно-действенному мышлению. Улучшено способность к оценке и регуляции пространственно-временных и динамических параметров движений, устойчивость равновесия статического и динамического.

Ключевые слова: задержка психического развития, координационные упражнения, методика, младший школьный возраст.

Introduction. Children with mental retardation today are a special category that requires increased attention from specialists [9]. According to the data, they make up from 12 to 18 % of the total number of those entering the first form of a secondary school [5]. The presence of this fact testifies to the urgent need to find new approaches to solving a problem.

The analysis of literary sources has shown that today some aspects of correction of the delay of mental development of schoolchildren are studied. In particular, the method of physical exercises for teenage children with MR is scientifically substantiated [4]. The organizational and methodical bases of the use of mobile games in the physical education of junior pupils with MR [6] have been studied. Methods of correction of memory indices in children aged 6 years with MR [3] have been developed. An integrative correction-development program for the rehabilitation and adaptation of children with peculiarities of psychophysical development was created [8]. Study of age and individual psychosomatic features of children of junior school and adolescence are viewed as predictors of mental development [11].

At the same time, with the coverage of individual aspects of the problem under investigation, there are no comprehensive studies on the justification of the methodology for coordinating exercises of junior pupils as an effective means of correction of mental retardation.

The purpose of the work is to substantiate the effectiveness of the influence of physical exercises on coordination abilities, mental processes and properties of pupils of junior school age with a delay of mental development.

Materials and methods of research. To achieve the goal, the following research methods are used:

- *theoretical* – analysis of psychological and pedagogical, special literature and documentary sources, comparison, systematization of information (for argumentation of the initial provisions of the study, generalization of available data, substantiation of the essential content of key concepts);

- *empirical* – testing of the level of development of coordination abilities and mental processes and properties (for studying the impact of the developed methodology on the students of junior classes with the LRR); theoretical modeling, pedagogical experiment (statement, forming) – for the development of teaching and methodological support for training in coordination exercises and the identification of the effectiveness of the proposed methodology;

- *statistical* – for processing empirical data, checking the reliability of the results obtained by methods of mathematical statistics.

The research took place during 2012-2016 and was implemented in four stages:

- the analytical-qualifying stage (2012-2013) envisaged the analysis of psychological and pedagogical, scientific and methodological literature on the problem of delaying the mental development of junior schoolchildren, methods and means of training the coordination rights of junior schoolchildren; definition of object, subject, goal, tasks, research program; accumulation and systematization of empirical material.

– the search phase (2013–2014) – the definition of the state of development of coordination abilities of mental processes and properties in younger students with a delay in mental development and their interrelations; the formation of structural components of the author's methodology for teaching coordination exercises of junior school age students with a delay in mental development in physical education lessons.

– the formative stage (2014–2015) was the implementation of the author's methodology for teaching coordinating exercises of junior schoolchildren with a mental retardation and checking its effectiveness in practice.

– the generalization phase (2015–2016) envisaged the analysis, generalization of the results of approbation of the methodology of teaching coordination exercises of junior school age with the delay of mental development in physical education lessons, writing conclusions and predicting future perspectives of the study.

Research and experimental work was carried out on the basis of the Lutsk Training and Rehabilitation Centre. Experimental group was 29 people. The control group included 30 students.

Research results. The study of the preconditions for the implementation of the methodology for coordinating exercises for junior schoolchildren with a delay in mental development revealed the existence of a problem of development of coordination qualities, psychological processes and properties in modern junior schoolchildren with MR. In general, it has been established that the study of quality, processes and properties are at a low level of control. The heterogeneity of groups according to indicators was revealed: in each age group there are students with a higher level of development and with very low.

In particular, the study of the possibilities for orientation in space implemented through the race to numbered stuffed 5 balls. It is established that among the students of all classes of control and experimental groups there is no statistically significant difference between the indicators of ability to orientation in space (Table 1).

Table 1

The state of development of coordination abilities in junior schoolchildren with a delay of mental development

Group	n	X	S	Sx	V %	± %	t (U)	P
Second Graders Dexterity Indicators								
Control	16	12,73	1,28	0,33	10,05	6,68	-1,014	>0,05
Experiment	10	13,58	2,45	0,82	18,04			
Third Graders Dexterity Indicators								
Control	7	13,56	1,68	0,69	12,39	2,21	-0,347	>0,05
Experiment	9	13,86	1,76	0,62	12,70			
Fourth Graders Dexterity Indicators								
Control	9	10,35	1,07	0,38	10,34	18,84	-2,773	<0,01
Experiment	11	12,3	2,01	0,64	16,34			
Second Graders Orientation in Space Indicators								
Control			2,65	0,71	15,92	-0,60	71 ^(U)	>0,05
Experiment (N)	10	16,75	2,75	0,92	16,42			
Third Graders Orientation in Space Indicators								
Control	6	20,56	3,77	1,69	18,34	3,11	-0,281	>0,05
Experiment	8	21,2	4,74	1,79	22,36			
Fourth Graders Orientation in Space Indicators								
Control	9	14,31	2,15	0,76	15,02	9,36	45 ^(U)	>0,05
Experiment (N)	10	15,65	5,65	1,88	36,10			
Second Graders Static Equilibrium Indicators								
Control (N)	14	14,18	8,69	2,41	61,28	3,81	61,5 ^(U)	>0,05
Experiment	10	14,72	9,7	3,23	65,90			
Third Graders Static Equilibrium Indicators								
Control (N)	6	11,32	21,52	9,62	190,11	54,77	27 ^(U)	>0,05
Experiment	8	5,12	4,07	1,54	79,49			
Fourth Graders Static Equilibrium Indicators								
Control	8	29,84	20,91	7,90	70,07	62,60	2,256	<0,05
Experiment	11	11,16	12,36	3,91	110,75			

End of the table 1

Second Graders Dynamic Equilibrium Indicators								
Control	15	10,40	2,96	0,79	28,46	1,06	0,106	>0,05
Experiment	10	10,29	2,21	0,74	21,48			
Third Graders Dynamic Equilibrium Indicators								
Control	6	12,08	4,40	1,97	36,42	13,91	-0,621	>0,05
Experiment	8	13,76	5,72	2,16	41,57			
Fourth Graders Dynamic Equilibrium Indicators								
Control	9	8,89	3,11	1,10	34,98	8,10	0,510	>0,05
Experiment	9	8,17	2,87	1,01	35,13			

Note: (U) - Mann-Whitney's U-criterion, which compared the difference between two independent samples with a distribution other than normal; (N) - a group of data with a distribution other than normal.

Students of the second control class were running to numbered stuffing balls for 16.7 seconds, their peers in the experimental group for 16.8 seconds. In third-graders, the results in the control group were 20.6 s, in the experimental group – 21.2 s. Fourth-graders of the control group performed the test for 14.3 seconds, and their peers in the experimental group for 15.7 seconds.

The analysis of the coefficient of variation shows that all six groups studied according to the results of testing the orientation in space can not be called homogeneous. The coefficient of variation is ranged from 15% to 36%. This in turn indicates that the ability to orientate in the space of schoolchildren significantly differed in the level of development within these age groups.

The evaluation of the results of the testing of orientation in space in accordance with the normative literature available [7] shows a very low level of development of this quality in junior schoolchildren with MR. Only one of the average results of all tested classes approached the standards. In particular, in the fourth-graders of the control group, the average result was 14.3 s, which corresponds to a sufficient level of development of first-graders. Such a result shows a significant lagging of children with MR from norms on the level of development of orientation in space.

At the same time the improvement with age of a number of coordination qualities, psychological processes and properties in junior schoolchildren with the MR. In view of this positive dynamics, it can be argued that developmental features are characteristic of the cortical, mental processes and properties of the investigated contingent.

Investigations of the peculiarities of the correlation interactions of coordination abilities with mental processes and properties have established that the more complex coordination quality, the more correlated, with the greater number of coordination abilities, mental processes and properties. Accordingly, the level of development of more quantity of qualities it is due [10].

The obtained research results confirmed our hypothesis about the existence of a close relationship between the coordination abilities and the psychological processes and properties of children. This has led to the assumption that the development of coordination quality can contribute to improving the mental processes and characteristics of children with MR. The theoretical foundation for this provision is the scientific concept of the unity of the organism as an integral system, where all components are closely interrelated and largely interdependent [1; 2].

In this regard, further research was aimed at the development and theoretical justification of the effectiveness of the methodology of teaching coordination exercises of junior school age with a delay in mental development in the lessons of physical culture. On the basis of experimental techniques the state educational curriculum for physical education for general education institutions (1–4 classes) is given.

The author's experimental method of teaching coordination rights is aimed at achieving the main goal – optimization of physical and mental development of junior pupils with MR. Achieving the goal involves solving two interrelated tasks: development of coordination abilities; the development of mental processes and properties.

In the structure of the method, it is conditionally possible to distinguish two main blocks – mental and physical. The first block (mental) includes the following main processes and properties: memory (visual and auditory); thinking (figuratively-logical and visual-acting). The physical (second) unit includes the following coordination qualities: agility (ability to evaluate and adjust the dynamic and time parameters of motion,

orientation in space); equilibrium (static and dynamic). Both blocks are one integral pedagogical process of schoolchildren with MR, their division during the implementation of the experimental method is conditional.

The tools used during the implementation of the methodology were divided into general and special. The common means include: theoretical knowledge; basic gymnastics; mobile games and fun, relay race; elements of athletics; general development exercises; elements of self-massage. Each group of general funds is divided into subgroups, and those in turn consist of special means. A characteristic feature of special means is the conditions for their implementation. All of them are chosen in such a way as to most effectively promote the development of coordination abilities, mental properties and processes.

The component of the author's technique is the criterion of a complex evaluation of the level of development of coordination abilities, mental processes and properties in junior schoolchildren with the MR. Mental processes and properties are evaluated according to indicators: visual and auditory memory; figuratively-logical and visual-action thinking. Assessment of coordination abilities is carried out using indicators of dynamic and time parameters of motion, orientation in space, static and dynamic equilibrium. For this purpose, the following tests are used: «Remember the pictures», «Remember the words», «Seasons», «Cutting figures», «Shutter run 3 Ч 10 m», «Running to 5 numbered balls», «Methodology of Bondarevsky» and «Turning on the gymnastic bench».

Evaluation is based on quantitative (points) and qualitative (verbal) indicators. A quantitative evaluation system provides a five-point scale for each quality. For a comprehensive assessment of the child's development, all quantitative test results are added.

Qualitative evaluation criteria are verbal assessments such as "Good", "Very good", "Excellent", "Excellent" and "Fairy", which correspond to a certain quantitative assessment. Teacher at the lessons in direct contact with students used only qualitative assessments. Quantitative evaluation is used to control the state of coordination abilities, mental processes and properties, their dynamics.

The study of the influence of the experimental methodology on the coordination qualities, psychological processes and properties of junior pupils with LRR, has established its greater efficiency compared to the generally accepted (Table 2).

Table 2

Coordinating abilities of junior schoolchildren with a delay of mental development in conditions of experimental technique

Group	n	X	S	Sx	V %	± %	t (T)	P	± %	t (U)	P
Second Graders Dexterity Indicators											
Control	13	11,84	1,12	0,32	9,46	6,99	1,936	>0,05	1,44	0,326	>0,05
Experiment	8	12,01	1,08	0,41	8,99	11,56	2,220	<0,05			
Third Graders Dexterity Indicators											
Control	6	11,24	1,29	0,58	11,48	17,11	2,718	<0,05	5,16	0,740	>0,05
Experiment	9	11,82	1,50	0,53	12,69	14,72	2,609	<0,05			
Fourth Graders Dexterity Indicators											
Control (N)	11	10,37	1,47	0,46	14,18	0,19	0,032	>0,05	6,27	42 ^(U)	>0,05
Experiment	12	11,02	1,11	0,33	10,07	10,41	2,246	<0,05			
Second Graders Orientation in Space Indicators											
Control	13	15,48	2,39	0,69	15,44	7,03	1,191	>0,05	3,20	0,580	>0,05
Experiment	8	15,00	1,21	0,46	8,07	10,45	3 ^(T)	<0,05			
Third Graders Orientation in Space Indicators											
Control	6	18,17	3,59	1,61	19,76	11,62	1,040	>0,05	2,73	0,300	>0,05
Experiment	9	18,68	1,56	0,55	8,35	11,89	2,217	<0,05			
Fourth Graders Orientation in Space Indicators											
Control	11	13,41	2,42	0,77	18,05	6,29	0,833	>0,05	1,94	48 ^(U)	>0,05
Experiment (N)	12	13,15	1,76	0,53	13,38	15,97	13 ^(T)	<0,05			
Second Graders Static Equilibrium Indicators											
Control (N)	13	17,81	10,14	2,93	56,93	25,60	35 ^(T)	>0,05	4,49	55 ^(U)	>0,05
Experiment	8	18,61	2,03	0,77	10,91	26,43	2,220	<0,05			
Third Graders Static Equilibrium Indicators											
Control	6	14,70	12,61	5,64	85,78	29,86	16 ^(T)	>0,05	31,37	28 ^(U)	>0,05
Experiment (N)	9	11,19	5,35	1,89	47,81	118,55	2,383	<0,05			

End of the table 2

Fourth Graders Static Equilibrium Indicators											
Control	11	28,63	17,41	5,51	60,81	-4,05	0,141	>0,05	25,92	1,25	>0,05
Experiment	12	21,21	7,11	2,14	33,52	90,05	2,790	<0,05			
Second Graders Dynamic Equilibrium Indicators											
Control	13	9,04	2,97	0,86	32,85	13,08	1,144	>0,05	7,63	0,678	>0,05
Experiment	8	8,35	1,45	0,55	17,37	18,85	2,312	<0,05			
Third Graders Dynamic Equilibrium Indicators											
Control	6	8,99	2,78	1,24	30,92	25,58	1,547	>0,05	12,72	25 ^(U)	>0,05
Experiment (N)	9	10,30	1,98	0,70	19,22	25,15	2,444	<0,05			
Fourth Graders Dynamic Equilibrium Indicators											
Control (N)	11	10,12	4,20	1,33	41,50	13,84	0,685	>0,05	20,65	44 ^(U)	>0,05
Experiment (N)	12	8,03	1,15	0,35	14,32	1,71	0,204	>0,05			

Note: (T) – The Wilcoxon T-criterion, by which the dependent samples with a distribution other than normal were compared.

In experimental classes there were more significant statistically significant changes in the coordination qualities, mental processes and properties of junior pupils with MR. At the same time, we can also talk about some effectiveness of the conventional methodology, since some positive changes are also found in the control classes.

Visual memory has significantly improved on average by 3 experimental classes by 19 %, by listening by 55 %, figurative logical thinking by 25 %, speed and accuracy of visual-action thinking by 24 % and 23 % respectively. The control classes did not reveal any statistically significant changes in the tendency to improve visual and auditory memory by 7 % and 24 %, figurative logic thinking by 14 %, speed and accuracy of visual-action thinking by 5 % and 12 %.

The average gains in agility in the three experimental classes were 12 %, the ability to orient in space – 13 %, the static equilibrium – 77 % and dynamic equilibrium – 16 %. There were no statistically significant changes in the control qualities in the control classes of coordination qualities. The general tendency to improve agility by 13 %, orientation in space by 8%, static equilibrium at 16 and a dynamic 17 % equilibrium are revealed.

The analysis of the dynamics of the homogeneity of the groups by the coefficient of variation also showed the effectiveness of the author's technique. During the study period in the experimental groups the variations of all the studied parameters decreased, in control groups no significant changes were detected. In experimental groups, the variation of coordination qualities dropped from 48 % to 18 % on average and psychiatric processes and properties ranged from 39 % to 14 %.

According to the developed protocol of complex evaluation of coordination qualities, psychological processes and properties of junior pupils with MR, improvement of their development in the conditions of experimental research was found out. Second-graders saw an improvement in the level of development from above average to high, while in third-graders from below average to average. The level of development of the studied qualities of the fourth-graders was average with a positive dynamics of the total number of points during the study period.

Discussion. The conducted research confirms that for the first time the efficiency and effectiveness of teaching methods for coordinating exercises of pupils of junior school age with delayed mental development in physical education lessons have been developed and substantiated. Statistical analysis has confirmed its greater efficiency in comparison with the generally accepted method used during physical education of children with MR.

This study expanded and complemented the state curriculum on physical culture for students of grades 2–4 with a mental retardation. A characteristic feature of the author's technique is that by developing coordination abilities, it contributes to the improvement of spontaneous operative visual and auditory memory, figuratively-logical and visual-action thinking of junior schoolchildren with MR.

The research complements the data related to the methodology of occupations by the physical culture of adolescent schoolchildren with MR [4]. At the same time, in our opinion, the study of the contingent of junior pupils is more significant from a practical point of view, since this very age is sensitive to the development of coordination abilities and mental processes and properties. Also, data on correction of

memory indices in children 6 years of age with means of physical education is added [3]. Our study, in addition to memory, embodies figurative logic and visually-effective thinking. It involves a larger age range of children.

In the course of research, correlation relations of coordination qualities with mental processes and properties have been revealed and the interdependence of their development has been confirmed. This is in agreement with the fundamental provisions of the theory of functional systems that consider an organism as a whole, in which all phenomena and processes are interrelated and interdependent [1].

At the same time, the current developments of organizational and methodological foundations for the use of mobile games in the physical education of junior schoolchildren with MR [6], the results of these studies specify the structure of general and special means of training coordinating exercises of junior school students with a delay in mental development [7]. The study is comprehensive and allows for a MR.

The practical significance of the results obtained is that the proposed methodology for teaching coordination exercises of junior high school students with a mental retardation can be used in the process of educational and correctional work. The main provisions can be used in conducting methodological seminars, training courses for teachers of physical education and teachers of pedagogical universities.

Practical significance is confirmed by the acts of implementation of research results used in the form of an author's methodology for teaching coordinating exercises of junior schoolchildren with a delay in mental development at physical education lessons at the Lutsk Training and Rehabilitation Centre (from 1.09.2016) while reading theoretical and practical disciplines for students of the Department of Physical Rehabilitation, and applied by students during the course of specialized practice at the Lutsk Institute of Human Development at the University of Ukraine" (from 1.09.2016), during the development of the initial programs, and used during the reading by teachers of educational disciplines, "Fundamentals of Defectology", "Theory and Methods of Physical Education" as well as the pedagogical practice of students of the Lesia Ukrainka Eastern European National University (from 1.09.2016).

Conclusions and perspectives of further research.

1. The research has established that the coordination qualities, mental processes and properties of younger students with a delay in mental development are at a low level.

2. The method of training of coordination exercises of pupils of junior school age with the delay of mental development on the lessons of physical culture, aimed at optimization of physical and mental development is developed.

3. The positive dynamics of coordination qualities, psychological processes and properties of junior schoolchildren with MR are revealed as evidence of the effectiveness of coordination exercises for junior pupils with a mental retardation.

The study does not claim to comprehensively solve all aspects of the problem being studied. The prospect of further research is seen in the development and substantiation of the effectiveness of methods of developing the coordination qualities, psychological processes and properties of secondary and senior students with a mental retardation.

References

1. Anokhin, P. K. (1980). *Uzlovye voprosy teorii funktsional'noi sistemy*. Moskva: Nauka, 196.
2. Bashtan, S. O., Shmaliei, S. V. (2015). *Vzaimozv'iazok funktsionalnoi ta fizychnoi pidhotovlenosti ditei molodshoho shkylnoho viku z zatrymkoiu psykhychnoho rozvytku*. *Pryrodnychiy almanakh*, 15, 5–13.
3. Hvozdet'skaia, S. V. (2008). *Korreksiia pokazatelei pamiaty u detei 6 let s zaderzhkoi psykhycheskoho razvitiia sredstvami fizycheskoho vospitaniia*. *Pedahohika, psykholohiia i mediko-biolohicheskie problemy fizycheskoho vospitaniia i sporta*, 7, 31–33.
4. Dovhal, V. I. (2013). *Naukove obgruntuvannia eksperymentalnoi metodyky zaniat dlia shkoliariv-pidlitkiv iz zatrymkoiu psykhychnoho rozvytku*. *Fizychno vykhovannia, sport i kultura zdorovia u suchasnomu suspilstvi*, 1 (21), 98–102.
5. Illiashenko, T. D., Bastun, N. A., Sak, T. V. (2007). *Dity iz zatrymkoiu psykhychnoho rozvytku ta yikh navchannia: navchalnyi posibnyk dlia pedahohiv i shkylnykh psykholohiv*. *Ministerstvo osvity Ukrainy, Instytut zmistu i metodiv navchannia*. Kyiv: IZMN, 128.
6. Lesko, O. M. (2004). *Orhanizatsiino-metodychni osnovy vykorystannia rukhlyvykh ihor u fizychnomu vykhovanni molodshykh shkoliariv iz zatrymkoiu psykhychnoho rozvytku*. *Avtoreferat dysertatsii kandydata nauk z fizychnoho vykhovannia i sportu*. *Lvivskii derzhavnyi instytut fizychnoi kultury*, 20.
7. Liakh, V. I. (2006). *Koordinatsionnye sposobnosti: diahnostika i razvitie*. Moskva: TVT Divizion, 290.

8. Naboikina, E. (2008). Intehrativnaia korrektsionno-razvivaiushchaia prohramma reabilitatsii i adaptatsii detei s osobennostiami psikhofizicheskoho razvitiia. *Shkol'nyi psikhologh*. Moskva: Izdatel'skii dom «Pervoe sentiabria», 17, 7–14.
9. Pokamestova, O. V. (2014). Osobnosti detei s zaderzhkoi psikhicheskoho razvitiia (ZPR) v period obucheniia v nachal'noi shkole. *Problemy sovremennoi nauki i obrazovaniia*, 12 (30), 126–127.
10. Tuchak, O. A., Romaniuk, V. P., Kots, M. O. (2015). Osoblyvosti vzaiemozviazkiv koordynatsiinykh zdibnostei iz psikhichnymy protsesamy ta vlastyostiamy v molodshykh shkoliariv iz zatrymkoiu psikhichnohoro zvytku. *Fyzichne vykhovannia, sport i kultura zdorovia u suchasnomu suspilstvi*, 4 (55), 196–200.
11. Shmarhun, V. M. (2010). Vikovi ta indyvidualni psykhosomatychni osoblyvosti ditei yak predyktory rozumovoho rozvytku (molodshyi skilnyi i pidlitkovyi vik). Avtoreferat dysertatsii doktora psykholohich nykh nauk. Natsionalny I pedahohichyi universytet imeni M. P. Drahomanova, 39.

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